REV. 2

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ECOLOGICAL RISK ASSESSMENT
FOR
SAUGET AREA I

SAUGET
ST. CLAIR COUNTY, ILLINOIS

June 30, 2001

Prepared for:

Solutia, Inc.
10300 Olive Boulevard
St. Louis, MO 63141

Prepared by:

Menzie-Cura & Associates, Inc.
One Courthouse Lane, Suite Two
Chelmsford, MA 01824

Katherine A. Fogarty
Katherine A. Fogarty, PE
Project Manager

Sue K-Driscoll (c.m)
Susan Kane Driscoll, Ph.D.
Project Reviewer

Charles A. Menzie
Charles A. Menzie, Ph.D.
Principal

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ACRONYMS

AhR	Aryl Hydrocarbon Receptor
AWQC	Ambient Water Quality Criteria
COPC	Compounds of Potential Concern
DAS	Developed Area Soil
DDE	Dichlorodiphenyl dichloroythelene, a breakdown product of DDT
DDT	Dichlorodiphenyl trichloroethane, an insecticide
EMPC	Estimated Maximum Potential Concentration
FFG	Functional Feeding Groups
IEPA	Illinois Environmental Protection Agency
J	Data Qualifier, Indicates Estimated Value
LEL	Lowest Effect Levels
LOAEL	Lowest Observed Adverse Effect Level
M	Data qualifier; indicates estimated maximum potential concentrations for dioxins
MCPA	2-Methyl-4-chlorophenoxyacetic acid, an herbicide
MCPP	2-(2-Methyl-4-chlorophexoxy) proprionic acid, an herbicide
NOAEL	No Observed Adverse Effect Level
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PEC	Probable Effects Concentrations
QAPP/FSP	Quality Assurance Project Plan/Field-Sampling Plan
RPM	Remediation Project Manager
SEL	Severe Effect Levels
SVOC	Semi-volatile Organic Compounds
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TEC	Threshold Effect Concentrations
TEF	Toxic Equivalency Factor
TEQ	Toxic Equivalency Quotient
TOC	Total Organic Carbon
TRV	Toxicity Reference Value
U	Data Qualifier; indicates not detected above given detection limit
UAS	Undeveloped Area Soil
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compounds

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1.0 INTRODUCTION

This baseline ecological risk assessment for Sauget Area I in Sauget and Cahokia, Illinois, addresses Dead Creek surface water and sediment and surficial floodplain soils. Figure 1-1 shows the site locus. The risk assessment follows the work plan for the project (Ecological Risk Assessment Work Plan for Sauget Area I, Sauget, St. Clair County, Illinois, Prepared for Solutia, Inc., St. Louis, MO, Menzie-Cura & Associates, Inc., August 12, 1999; Appendix A) and notes where deviations from the work plan exist due to unanticipated differences in site conditions. It also addresses comments from regulatory agencies received in April and May, 2001.

With the agreement of the United States Environmental Protection Agency (USEPA) Remediation Project Manager (RPM) Michael McAteer, the portion of the ecological risk assessment that addresses the aquatic habitat of Dead Creek is restricted to a portion of Dead Creek Segment F and the Borrow Pit Lake. Creek Segments B through the upper portion of F are subject to a Unilateral Administrative Order (UAO) issued by the USEPA on May 31, 2000 to Monsanto Company and Solutia Inc. (Docket No. V-W-99-C-554) pursuant to section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended, 42 U.S.C. Section 9606(a). The Order requires the following response activities at Sauget Area 1 Creek Segments B and Site M and Creek Segments C, D, E, and F upstream of the Terminal Railroad Association embankment, which are located in Sauget and Cahokia, Illinois (Figure 1-1):

- Preparation of a Time Critical Removal Action Work Plan;
- Implementation of the Removal Action in accordance with the Work Plan to mitigate the threats posed by presence of contamination in Dead Creek sediments and certain adjacent soils and their potential migration via overflow and flood waters from the Site;
- Removal of materials from CS-B (creek sediments, creek bed soils and flood plain soils); CS-C, D, and E (non-native creek sediments only); and Site M (pond sediments and pond bottom soils) in Sauget Area 1, while minimizing adverse impacts to area wetlands and habitat;
- Proper handling, dewatering, treatment and placement of such materials in the on-site Containment Cell;
- A plan for management of Dead Creek storm water during the removal action;
- Sampling and analysis of areas where materials has been removed, for the purpose of defining remaining contamination;

- Placement of membrane liner material over CS-B and in all other excavated areas where, based on post-removal sample results, such liner is determined to be necessary; and

- Design of a containment cell which will provide adequate protection to human health and the environment.

The Order requires Solutia to conduct these removal activities to abate a potential imminent and substantial endangerment to the public health, welfare or the environment that may be presented by the actual or threatened release of hazardous substances at or from the site.

Currently, the UAO is being modified by the Agency to include removal of sediments in Creek Section F from Route 157 to the eastern boundary of the Borrow Pit Lake. Approximately 5,000 cubic yards of sediment will be removed from this 5,300 foot long stretch of Dead Creek and contained in the on-site disposal cell being constructed adjacent to Creek Section B.

These removal actions do not address Dead Creek floodplain soils. These are evaluated in a screening-level terrestrial ecological risk assessment.

1.1 Regulatory Guidance

The assessment follows current USEPA guidance in:

> *Ecological Risk Assessment Guidance For Superfund: Process For Designing and Conducting Ecological Risk Assessments* (USEPA, 1997); and
>
> *Guidelines for Ecological Risk Assessment* (EPA/630/R-95/002F, April 1998).

Previously, Environment and Ecology, inc. conducted a Preliminary Ecological Assessment of Dead Creek Segment F (environment and ecology, inc., 1997) for the USEPA, which essentially provides the screening analyses required in Steps 1 and 2 of the guidance (USEPA, 1997). This work was based on a site visit conducted in April 1997, and the collection of eight sediment samples (and one duplicate) from Dead Creek Section F and the Borrow Pit Lake. (Their terminology referred to the entire area as Dead Creek Section F.) Their "background" sediment sample was collected from the Borrow Pit Lake. Their observations indicated that:

> The vegetation is of low floristic quality, consisting primarily of invasive and pioneer plants. This is consistent with the fact that the wetlands were drained and the woods cleared prior to the 1930s, and the surrounding land is highly

> disturbed by agriculture and industry. However, the site does provide good quality wildlife habitat, as evidence by its use by the Black-Crowned Night Heron, a state-listed endangered species. Also, there are plentiful detrital inputs (twigs, bark, and leaf litter) to the creek, which provides a substantial food base to benthic invertebrate populations. One limitation to the benthic invertebrate population is the lack of riffle areas and therefore, a potential for periods of low dissolved oxygen levels.

Their data indicated that some metals, polychlorinated biphenyls (PCB), polynuclear aromatic hydrocarbons (PAH), and dioxin concentrations in sediment were above ecological screening levels. They concluded that the site warranted further investigation of ecological risks.

1.2 Site Description

Sauget Area I has been subjected to multiple historic industrial discharges, waste disposal and manufacturing activities over an extended period of time. A detailed description of site history and use is presented in the Engineering Evaluation/Cost Analysis, Remedial Investigation/Feasibility Study, Sauget Area 1, Sauget and Cahokia, Illinois, prepared by Roux Associates, Inc., March 9, 2001. Sauget Area 1 is centered on Dead Creek, an intermittent stream that is approximately 17,000 feet long, and its floodplain. Dead Creek is an industrialized drainage channel that flows through industrial, commercial, residential, and agricultural areas (Figure 1-1). Three closed municipal/industrial landfills (Sites G, H, and I), one backfilled wastewater impoundment (Site L), one flooded borrow pit (Site M), and one borrow pit backfilled with concrete rubble and demolition debris (Site N) are within Sauget Area I and the Dead Creek floodplain.

In the past, Dead Creek received direct wastewater discharges from industrial sources and served as a surcharge basin for the Village of Sauget municipal sewer collection system. When the system became backed up or overflowed, untreated wastes from industrial users of the sewer system were discharged directly into Dead Creek Section A. The culvert between Creek Sections A and B was blocked in 1968. Creek Section A was remediated and backfilled in 1990. The remainder of Dead Creek received wastes via downstream flow from Creek Section A prior to 1968. Creek Section B is hydraulically connected to Site M via a man-made ditch. Site M may have also received wastes in the past. Dead Creek continues to receive runoff from roadways, agricultural, industrial, and residential areas.

1.3 Organization of the Report

All of the elements of a standard ecological risk assessment, as described in the standard guidance documents cited in Section 1.1, are contained in this report. However, the order of presentation of some of the elements has been changed to facilitate the implementation of a weight-of-evidence approach for risk characterization. The organization of this report is presented below.

- **1.0 INTRODUCTION**
  This section provides an introduction to the project and an overview of applicable regulatory guidance.

- **2.0 BACKGROUND**
  This section discusses relevant background information for the site.

- **3.0 PROBLEM FORMULATION**
  This section presents the Conceptual Site Model and identifies ecological receptors. The Problem Formulation section of the risk assessment was previously outlined in the scope of work for the project (Menzie-Cura & Associates, Inc., 1999; Appendix A).

- **4.0 SELECTION OF ASSESSMENT AND MEASUREMENT ENDPOINTS**
  This section identifies Assessment Endpoints and Measures of Effects, although these elements are typically discussed in Problem Formulation.

- **5.0 EXPOSURE ASSESSMENT**
  This section briefly describes the data used in the ecological risk assessment and the selection of COPCs.

- **6.0 ECOLOGICAL EFFECTS ASSESSMENT**
  This section briefly describes the approaches that are used to assess ecological effects.

- **7.0 RISK CHARACTERIZATION**
  This section presents the interpretation of the data. This section discusses measures of effects, together with other measures that are used to evaluate the individual assessment endpoints.

- **8.0 DISCUSSION OF ECOLOGICAL RISK**
  This section discusses the weight-of-evidence for each assessment endpoint.

- **9.0 DISCUSSION OF UNCERTAINTIES AND EXPOSURE ASSUMPTIONS**
  This section analyzes the uncertainties associated with the risk assessment.

- **10.0 FINDINGS**
  This section briefly presents the findings of the assessment.

2.0 BACKGROUND

This section provides a description of Dead Creek, the Borrow Pit Lake, and reference areas.

2.1 Dead Creek and the Borrow Pit Lake

Dead Creek begins immediately south of Queeny Avenue in an industrial area of Sauget, Illinois and flows slowly south through residential neighborhoods (Figure 1-1). Along most of its length, the stream is bordered by a dense, narrow band of riparian trees and shrubs. Homeowners have cleared to the creek's edge and have established lawn along several sections. Creek Section B runs from Queeny Avenue south to Judith Lane, Section C from Judith Lane to Cahokia Street, Section D from Cahokia Street to Jerome Street, and Section E from Jerome Street to the intersection of Routes 3 and 157. Section F begins at the intersection with Route 3, crosses the intersection, passes through a culvert at railroad tracks, and continues to the southwest toward the Borrow Pit Lake. As discussed in Section 1.0, this ecological risk assessment addresses Dead Creek Section F from the railroad culvert south and the Borrow Pit Lake (Figure 2-1). Photographs of this area showing the predominant habitat types are in Appendix B.

West of Route 3, the creek flows south and west through the American Bottoms floodplain. This area contains active and abandoned agricultural land divided by levees and railroad right-of-ways. After Dead Creek flows under the railroad right-of-way, it is joined by a stream draining land from the north.

The Borrow Pit Lake is a borrow pond that was excavated during the construction of the local levee system. It covers approximately 530,000 square feet (approximately 200 feet by 2,650 feet). The United States Geological Survey (USGS) map of the area (Cahokia) indicates that the pond was dug to its current shape sometime after 1954. The pond is the largest non-flowing water body in the area. Its shore is surrounded with mature riparian trees. During time of high water, Dead Creek drains the pond through a pump station under a levee and flows into a ditched section of Old Prairie du Pont Creek. Storm water is allowed to accumulate in the Borrow Pit Lake until the water level reaches Elevation 10. Then the lift pumps are activated and accumulated water is pumped to Old Prairie du Pont Creek. This storm water management practice turns the Borrow Pit Lake into a storm water retention basin subject to large fluctuations in water level. The of channel of Old Prairie du Pont Creek flows northwest to Arsenal Island on the Mississippi River.

During the site reconnaissance and sampling in September, October, and November of 1999, water levels were extremely low in Dead Creek and the Borrow Pit Lake. Many areas of these water bodies were dry with exposed mud. Fish and other aquatic species (e.g., frogs) were concentrated in shallow puddles. These low water levels were persistent region-wide.

Observations made in the field in 1999 indicate that the water level in the Borrow Pit and Creek Sector F were low. This may be due to natural fluctuations in water level and may also be linked to the particularly dry growing season in 1999. Dead Creek is a series of small, shallow bodies of standing water. Examination of the creek bed and riparian vegetation suggests that Dead Creek does not retain substantial amounts of standing water during the summer months and that water levels are dependent on relatively recent precipitation. A memorandum authored by Bill McClain of the Illinois Department of Conservation dated July 23, 1992 to Tom Crause and dated received at the Illinois Department of Natural Resources on July 27, 1992 contains observations of Creek Sections B through F, indicating that a low water level is a normal condition in Dead Creek. Historical information obtained from a 1984 survey conducted in the American Bottoms by IEPA (1989) indicated that 12 out of 14 streams were at low flow conditions in summer. The report indicated that low to extremely low dissolved oxygen concentrations and elevated total suspended solids, total dissolved solids, turbidity, total phosphorus, and metals are common. Streams in the mid American Bottoms Basin (the area of Dead Creek) exhibit the greatest impact on macroinvertebrates and are considered moderate to limited aquatic resources.

Historical discharge data was obtained from the United States NWIS-W Data Retrieval system, maintained by the US Geological Survey (USGS), for other creeks in St. Clair County Illinois. The closest of these to Dead Creek were Canteen Creek (1972-1982), Mud Creek (1972-1982), and Richland Creek (1989-1999). A review of the historical discharge data from these creeks indicates a high variability in discharge over each year. However, for a large portion of each year, discharge is very low, often near zero. Both of these patterns occur each year, suggesting that low to zero flow conditions, as seen in Dead Creek in 1999, are common.

Section 7.2.1 provides additional detailed description of the habitat of Dead Creek and the Borrow Pit Lake.

2.2 Reference Areas

Reference areas for ecological risk assessment were selected during the ecological site reconnaissance and during the main sampling event. Details of the selection, summarized below, are included in the field report (Soil, Ground Water, Surface Water, Sediment, and Air Sampling Field Sampling Report, Sauget Area 1, Remediation Technology Group, Solutia, Inc., St. Louis, MO, O'Brien & Gere Engineers, Inc., September 2000).

The following criteria were applied for the selection of reference areas:

a) physical similarity to Dead Creek or the Borrow Pit Lake
b) location away from direct influence of industrial discharges, including major highways.

The reconnaissance survey was carried out over a three-day period in September 1999. The selection of reference sampling stations was discussed with Mr. Michael Ondrachek of Weston, who served as representative for the USEPA.

Two reference areas were selected during the reconnaissance survey. Reference Area 1 was a section of Old Prairie du Pont Creek near the town of East Carondelet, approximately 3 miles southwest of the end of Dead Creek in the Borrow Pit Lake. This section of Old Prairie du Pont Creek is a broad shallow water body with a mud substrate similar to the Borrow Pit Lake. It is distant from any influence from the site or other industrial areas, but is similar to the Borrow Pit Lake in that it is near agricultural land. Two sampling locations were selected in Reference Area 1. These are depicted on Figures 1-1 and 2-2; photographs are in Appendix B. It was not possible to obtain permission to sample in the second water body selected as a reference area during the reconnaissance survey.

To replace the second reference area selected during the reconnaissance survey, two bodies of water in Monroe County, collectively referred to as Reference Area 2, were selected during the main sampling event with the concurrence of Mr. Steven Broadman of Weston, the Agency's oversight contractor. These water bodies were approximately 20 miles south of Dead Creek and contained one sampling station each. Reference area 2-1 was in Long Slash Creek north of the culvert where Merrimac Road crosses the creek. This section was similar to Dead Creek sectors B through E in that it was shallow and muddy. It was similar to Dead Creek Section F in that it traversed an agricultural area. Reference area 2-2 was a flooded borrow pit north of Fountain Creek and was similar in depth, hydrology, and surrounding land use to the Borrow Pit Lake. These reference areas are shown on Figures 2-2 and 2-3. Photographs are in Appendix B. Table 2-1 presents water quality and sediment type in Dead Creek Section F, Borrow Pit Lake, and the reference areas.

Extensive effort was made during the site reconnaissance survey and the main sampling event to select appropriate reference areas. After completion of ecological sampling and preparation of the ecological risk assessment, the regulatory agencies in the end did not agree that the selected areas were appropriate to use as a reference area for Dead Creek or the Borrow Pit. Therefore, as directed by the regulatory agencies, the data collected from the reference areas will be presented in the report, but comparisons will not be made between measurements made at the site and the reference areas.

3.0 PROBLEM FORMULATION

The problem formulation phase of an ecological risk assessment develops the nature of the problem and presents a plan for analyzing data and characterizing risk. The problem formulation section of this assessment defines the assessment and presents a conceptual model that describes key relationships between potential stressors and assessment endpoints. Assessment endpoints are expressions of the environmental value to be protected at a site that are selected by the consensus of the regulators, the regulated community, and state or local concerns. The problem formulation for this risk assessment was presented in the project work plan (Appendix A).

3.1 Conceptual Site Model

The foundation of an ecological risk assessment is the conceptual site model. According to USEPA guidance, the conceptual model addresses:

environmental setting and contaminants known or suspected to exist at the site;

contaminant fate and transport mechanisms;

mechanisms of ecotoxicity and likely categories of potentially affected receptors;

complete exposure pathways.

Figure 3-1 provides a diagram of the Conceptual Site Model for the aquatic habitat of Dead Creek; Figure 3-2 is a diagram of the Conceptual Site Model for the terrestrial habitat of the floodplain. These models illustrate transport of compounds from the site media through the potentially affected habitats to important ecological receptors.

3.1.1 Environmental Setting and Contaminants Known or Suspected to Exist at The Site

The environmental setting is the aquatic environment of a shallow stream, broader semi-impounded basin, and floodplain as described in Section 2.1 of this report. The compounds of potential concern (COPCs) are selected in Section 5 of this report and include herbicides, pesticides, PCBs, metals, PAHs, and dioxins.

3.1.2 Contaminant Fate and Transport Mechanisms

In general, the source of COPCs to Dead Creek Section F and the Borrow Pit Lake is downstream transport of industrial and municipal wastewater discharges from upstream portions of Dead Creek. Groundwater discharge in the upstream portion of Dead Creek in the vicinity of

Sites G, H, I, and L does not appear to be a source for two reasons:

The EE/CA and RI/FS study performed by Roux Associates, Inc. (2001) indicated that except in times of a high water table, the bottom of Dead Creek and Borrow Pit Lake are above the water table.

Sampling of shallow groundwater in the Dead Creek floodplain indicated that COPCs have not been transported from Dead Creek to shallow groundwater or vice versa.

In addition, there has been little transport of creek sediments to floodplain soils.

The selected COPCs (herbicides, metals, PCBs, pesticides, and SVOCs) adsorb onto particulate matter to varying degrees. The transport mechanisms affecting particle distribution in aquatic systems include:

particulate runoff from the watershed,

deposition in areas of sluggishly flowing waters,

erosion in faster moving stream segments, and

resuspension of particulates from the stream bed and over the floodplain.

Chemicals with lower particle affinities may be more subject to dissolution in and transport by surface water. Increasing solubility generally correlates with increasing bioavailability. In particular, metals may be subject to transport in soluble form, depending on their valence states.

The major biological mechanisms affecting fate and transport are:

biological uptake directly from environmental media;

bioaccumulation through ingestion of prey or media; and

biomagnification through the food chain.

Most of the COPCs are subject to one or all of these biological fate and transport mechanisms. In particular, mercury, PCBs, organochlorine pesticides, and dioxins can biomagnify through the food chain.

3.1.3 Mechanisms of Ecotoxicity and Likely Categories of Potentially Affected Receptors

3.1.3.1 Ecotoxicity of Potential Site-Related Chemicals

The COPCs may affect the survival and reproductive capacity of benthic biota, fish, invertebrates, vascular plants, and wildlife. This section presents a short summary of the toxic mechanisms of some of the potentially site-related chemicals.

Herbicides

The available information on the effects of herbicides on plants, wildlife, aquatic organisms is largely confined to acute studies. Very few studies have investigated the chronic or subchronic effects of this class of compounds. In the USEPA's Environmental Effects Database (EEDB) (USEPA, 1995), toxicological data on terrestrial plants, insects, mammals, birds, and aquatic organisms (plants, invertebrates, fish) are available for the following herbicides:

- 2, 4-(dichlorophenoxy)acetic acid (2,4-D Acid);
- 2,4-(dichlorophenoxy)butanoic acid (2,4-DB Acid);
- 3,6-dichloro-2-methyoxybenzoic acid (Dicamba) and related compounds;
- 2-(2,4-dichlorophenoxy)propionic acid) (Dichlorprop(2,4-DP));
- 4-(chloro2-methylphenoxy)acetic acid (MCPA) and related compounds; and
- 2-(4-chloro-2-methylphenoxy)propanoic acid) (MCPP) and related compounds.

Summarized below are the effective concentration ranges of these herbicides for terrestrial and aquatic biota.

- Seed germination and seedling emergence of terrestrial plants is affected at 0.0027 to 4.2 pounds of herbicide acre of land.
- 3.6 to 100 ug of herbicide/insect will cause 50% of the test organisms to die.
- Dose of 400-800 mg herbicide/kg body weight resulted in death of 50% of the test mules.
- Herbicides at levels of 0.017 to 292 ppm can affect the growth of aquatic plant species.
- 100 to 35,440 ppm in food or 216 to 4640 mg/kg as a dose can result in 50% death of the exposed birds. Subchronic studies reveal that 1000 to 1600 ppm in food can lead to reproductive effects in birds.
- Aquatic invertebrates and fish are affected by herbicides at concentrations ranging from 1 to 1600 ppm. These effects include growth and mortality. Subchronic effects on invertebrates and fish fall within the acute effective concentration range.

Metals

Metals are naturally present in soil and sediment. Due to their varying toxicity, a few metals present in environmental media at the site will be discussed separately.

Arsenic

In many species of mammals, arsenic is a teratogen and carcinogen that can cross placental barriers and potentially cause fetal mortality or malformities. Wildlife may be exposed to arsenic via ingestion, inhalation, or absorption through the skin or mucous membranes. Arsenic is usually transported into cells through an active transport mechanism intended for transport of phosphates. Studies have associated chronic arsenic exposure with liver, kidney, and heart damage, hearing loss, brain wave abnormalities, and impaired resistance to viral infections (Eisler, 1988).

The mechanism of arsenic toxicity depends upon its chemical form and route, dose, and duration of exposure as well as the species and lifestage exposed. In general, early developmental stages are more sensitive to arsenic toxicity than adults (Eisler, 1988). Arsenites (As^{3+}) are more toxic than arsenates (As^{5+}), soluble arsenic compounds are more toxic than insoluble compounds, and inorganic arsenic compounds are more toxic than organic derivatives (ATSDR, 1991). Trivalent arsenic reacts with sulfhydryl groups of proteins and enzymes. Pentavalent arsenic may interfere with oxidative phosphorylation (Eisler, 1988).

Cadmium

Cadmium can be bioaccumulated by both aquatic and terrestrial organisms. Dissolved cadmium is bioconcentrated in freshwater and marine animals to concentrations hundreds to thousands of times higher than in the water. Data also show that cadmium can accumulate in grasses, crops, earthworms, poultry, cattle, horses, and wildlife. Data on biomagnification of cadmium are inconclusive. In vertebrates, cadmium accumulates mainly in the liver and kidney rather than in muscle tissue, therefore, biomagnification through the food chain may not be significant (ATSDR, 1991). Cadmium has been implicated as the cause of severe deleterious effects on fish and wildlife.

Copper

The toxicity of copper to aquatic life is related primarily to the presence of the free cupric ion, Cu^{2+} and possibly some of the hydroxy complexes (USEPA, 1984). Aquatic toxicity studies indicate that increasing alkalinity, hardness, and total organic carbon in natural waters decreases copper toxicity. Data for eight species indicate that acute toxicity decreases as hardness increases. Additional data for several species indicate that toxicity also decreases with increases in alkalinity and total organic carbon. Fish and invertebrate species seem to be about equally sensitive to the chronic toxicity of copper. Plants and phytoplankton are particularly sensitive to copper. Copper sulfate is used to treat algal blooms and growth of aquatic macrophytes in some lakes.

Copper is an essential nutrient for mammalian species. However, ingestion of elevated amounts of copper is associated with gastrointestinal, hepatic, hematological, musculoskeletal, cardiovascular, and renal effects, and changes in body weight in animals (ATSDR, 2000).

Lead

Exposure to lead may affect behavior and various body systems including the hematopoietic, skeletal, vascular, nervous, renal, and reproductive systems. In general, younger organisms are more sensitive to the adverse effects of lead exposure. In mammals, absorbed inorganic lead enters the blood and attaches to red blood cells. Lead is quickly distributed to extracellular fluid and other storage sites (possibly soft tissues and bone). Lead is excreted via bile to the small intestine for fecal excretion (Eisler, 1988).

Bioconcentration of lead has been observed in plants and animals. Generally limited by the strong absorption of lead to soil organic matter, the bioavailability of lead in soil to plants increases as pH and organic content of the soil decreases. There is no evidence that indicates that lead biomagnifies in terrestrial or aquatic food chains (ATSDR, 1993).

Mercury

Mercury is recognized as one of the most toxic of the heavy metals. Mercury is bioconcentrated and biomagnified in food chains. Mercury is not an essential element and has no known biological function. Studies have shown that it is a mutagen, teratogen, and a carcinogen. In general, younger life stages are most sensitive to the toxic effects of mercury. Organic forms of mercury (e.g. methylmercury) are more toxic than inorganic mercury (Eisler, 1987).

Numerous physical and biological factors can affect the acute and chronic toxicities and bioaccumulation of the various forms of mercury. For aquatic organisms, mercury accumulation is generally greatest at elevated water temperatures, reduced water salinities or hardness, reduced water pH, reduced organic matter content of the medium, and in the presence of zinc, cadmium, and selenium in solution. Elimination of mercury varies among aquatic species, however, it tends to be slow (Eisler, 1987).

Mammals can absorb organic forms of mercury through the respiratory tract, gastrointestinal tract, skin, or mucus membranes, and organic mercury compounds can cross placental barriers. Organic forms of mercury are more completely absorbed than inorganic forms, and they pass more readily through biological membranes and are excreted more slowly. Methylmercury can cross the blood-brain barrier (Eisler, 1987).

Nickel

Nickel is considered moderately to highly toxic to most aquatic plant species. To invertebrates, nickel is one of the least toxic inorganic agents. To both marine and freshwater fish, nickel is relatively nontoxic but when exposed to low levels over extended periods effects include reduced skeletal calcification and reduced diffusion capacity of gills. Both acute and chronic toxicity of nickel is strongly related to water hardness.

Zinc

Zinc is an essential micronutrient for all living organisms. Because zinc is essential, zinc is bioaccumulated by all organisms. The toxicity of zinc is dependent upon its chemical form and degree of interconversion among the various forms. Zinc will not be sorbed or bound unless it is dissolved, but bound zinc will dissolve in the digestive tract following the ingestion of particulates. The toxicity of undissolved zinc to a particular species depends on the feeding habits. Aquatic plants and most fish are relatively unaffected by suspended zinc in the water column. Both terrestrial and aquatic invertebrates and filter feeder fish might be adversely affected by ingestion of sufficient quantities of particulates containing zinc. The acute toxicity of zinc to aquatic animals is influenced by several parameters including increasing hardness, abundant dissolved oxygen and low temperatures which lower its potential toxicity.

Reported acute toxicity testing for freshwater organisms indicates that insects are most resistant whereas cladocerans and the striped bass are the most sensitive to zinc.

PAHs

The PAHs have been categorized by the number of aromatic rings in their chemical structure as well as by their carcinogenicity in laboratory animals. Although naphthalene is a two-ringed molecule, it is frequently categorized as a PAH. The other compounds are listed below and are three, four or five-ringed structures.

2-Ringed PAH	**3-Ringed PAHs**	**4-Ringed PAHs**	**> 4-Ringed PAHs**
naphthalene	Acenaphthene	Benzo(a)anthracene	Benzo(b)fluoranthene
	Acenaphthylene	Benzo(a)pyrene	Benzo(k)fluoranthene
	Anthracene	Chrysene	Benzo(g,h,i)perylene
	Fluorene	Fluoranthene	Dibenz(a,h)anthracene
	Phenanthrene	Pyrene	Indeno(1,2,3-cd)pyrene

Many of the 4 to 7 ring PAHs are carcinogenic, mutagenic, or teratogenic to a variety of organisms including fish and other aquatic biota, amphibians, birds, and mammals. In addition to tumor formation, other adverse effects have been observed for many species under laboratory conditions including effects on survival, growth, and metabolism (Eisler, 1987). Rather than enhancing detoxification, metabolism of some carcinogenic PAHs in induced animals could result in a higher steady-state level of toxic products (Stegeman, 1981).

In mammals, PAHs are readily absorbed after exposure by inhalation or oral intake and distributed to many tissues in the body. However, intestinal absorption of PAHs is dependent upon the presence of bile in the stomach. PAHs are also absorbed via dermal exposure, although very little is distributed to tissues (USEPA, 1982). Following absorption, metabolism via the cytochrome P-450 monooxygenase system is required for detoxification to more water-soluble forms of the compounds for efficient elimination from the body. The unmetabolized PAHs are not believed to be carcinogenic. During the detoxification process, some PAHs are metabolically activated to their carcinogenic intermediates. These intermediates can then bind to cellular macromolecules such as DNA, RNA, and proteins, resulting ultimately in the induction of cancer. For any of the PAHs, however, the majority of the metabolism results in detoxified metabolites that are rapidly excreted.

The formation of PAH-induced cancers in laboratory animals is well documented (USEPA, 1982). The genotoxicity and carcinogenicity of benzo(a)pyrene [B(a)P] is well established. Experimental data demonstrate that exposure to B(a)P yields gene mutations, chromosome aberrations, and tumorigenesis in mammalian cells. B(a)P, the most widely studied PAH congener, produces tumors in mice, rats, hamsters, guinea pigs, rabbits, ducks and monkeys after oral, dermal, and intratracheal administration. Immune suppression has also been observed in humans and mice exposed to B(a)P. Developmental effects *in utero* and lymphoreticular effects have been observed in mice exposed to B(a)P.

There is very little data available on the effects of PAHs on birds. In one study, mallards fed diets containing 4,000 mg PAHs/kg (mostly as naphthalenes, naphthenes, and phenanthrene) for 7 months showed a 25% liver weight increase and 30% increase in blood flow to the liver when compared to controls. Another study showed that some PAHs may have embryotoxic effects in birds (Eisler, 1987).

PCBs

Polychlorinated biphenyls (PCBs) are a class of synthetic chemicals that contain 209 individual compounds (congeners). Aroclor is the industrial trade name of some commercial PCB mixtures.

PCB exposure may result in a variety of toxic effects to wildlife including death, birth defects, reproductive failure, liver damage, skin lesions, tumors, and a wasting syndrome. Two main factors influence the toxicological properties of individual PCBs: the octanol-water partition coefficient (K_{ow}) and steric factors which are determined by patterns of chlorination. Individual PCBs with high K_{ow} values and high numbers of substituted chlorines in adjacent positions are generally of greatest concern.

Sensitivity to adverse effects of PCBs varies greatly even in closely related species. Several studies have demonstrated that mink are one of the most sensitive mammalian species tested for the effects of PCB exposure. It is well documented that PCBs interfere with reproduction in wildlife and in experimental animals. Reproductive failure due to high death rate of kits was observed in mink given diets supplemented with either 2 mg/kg Aroclor 1254 for 8 months or 5 mg/kg Aroclor 1254 for 4 months. Dietary levels of 1 mg/kg of Aroclor 1254 did not adversely affect reproduction. Placental transfer of PCBs has been documented in mink as well as in several other mammalian species. Mammary transport is an even more effective method of transferring PCBs from parent to offspring (Eisler, 1986).

The carcinogenic effects of PCBs have been reported in laboratory studies with mice and rats. Other systemic effects of PCBs reported in several species include hepatic disorders, increased thyroxin metabolism and ultrastructural changes in the thyroid, inhibition of ATP-ases, interference with oxidative phosphorylation, alterations in steroid hormone activities, immunosuppressive effects, and altered vitamin A metabolism (Eisler, 1986).

For birds, exposure to PCBs may result in disruption of growth, reproduction, metabolism, and behavior, such as courtship, nesting, and incubation. Signs of PCB poisoning in birds include morbidity, tremors, beak pointed upwards, and muscular incoordination, however, birds appear to be more resistant to acute effects of PCBs than mammals.

Organochlorine Pesticides

Organochlorine pesticides are one of several classes of insecticides, which include the chlorinated ethane derivatives (DDT and methoxychlor), the cyclodienes (chlordane, aldrin, dieldrin, heptachlor, endrin, and toxaphene), and the hexachlorocyclohexanes (lindane).

The persistence of organochlorines in the environment varies with each individual compound. Organochlorines, including aldrin, chlordane, endosulfan, and heptachlor, are reported as ranging from moderately persistent, with effectiveness ranging from 1 to 18 months, to persistent, retaining toxicity for years, perhaps as many as 50 to 100 years (Briggs, 1992). Lindane, DDT, DDE, DDD, dieldrin, endrin, and methoxychlor are persistent insecticides (Briggs, 1992).

Organochlorine insecticides are classified as neurotoxins. DDT is believed to act on the sensory and motor nerve fibers and the motor cortex, inducing repetitive firing in the presynaptic nerve membrane (Klaassen et al., 1986). Although the central nervous system is the primary site of toxic action, primary pathologic changes resulting from subacute or chronic feeding are observed in the liver. Large doses of DDT in animal studies result in centrolobular necrosis of the liver, while smaller doses result in liver enlargement. Methoxychlor and lindane have low central nervous system toxicity. Lindane and alpha-BHC are convulsants, while beta and delta-BHC are CNS depressants. The mechanism of neurotoxic action of these compounds has not been demonstrated.

As a result of the bioconcentration of organochlorine insecticides in ecosystems, organisms at the top of natural food chains may sustain injury due to the gradual accumulations of residues in organisms that make up their food sources. Reproductive success of certain species of wild birds is adversely affected by exposure to DDT or its metabolites (Klaassen et al., 1986). Eggshell thinning has been demonstrated following ingestion of DDT and related chlorinated hydrocarbon insecticides. In addition, the ability of DDT to enhance the metabolism of estrogen may have an impact on reproductive success in birds by creating an endocrine imbalance affecting egg laying and nesting cycles (Klaassen et al., 1986). Fish and some lower aquatic organisms are extremely sensitive to the acute toxicity of DDT.

Significant evidence of endocrine disruption exists for the following groups of organisms: snails, oysters, fish, alligators and other reptiles, and birds, such as gulls and eagles (USEPA, 1997). Significant population declines as a result of exposure to endocrine-disrupting chemicals have been reported for alligators in Central Florida and some populations of marine invertebrate species

Dioxins and Furans

Dioxins and furans include two classes of halogenated aromatic hydrocarbons, or congeners. Furans are often referred to as "dioxin-like compounds" because their structure and toxicity are similar to dioxins.

Exposure to dioxins and furans has been shown to cause acute toxicity to the liver in rodents and rabbits and the thymus in guinea pigs. Epidermal effects, such as chloracne have been seen in subchronic studies with rodents and monkeys. Other effects due to chronic exposure to dioxin-like compounds are wasting syndrome, hepatotoxicity, enzyme induction and endocrine effects. In general, congeners without lateral substitution of chlorines and with greater number of chlorine substitutions are more toxic than other congeners.

There is evidence from animal and epidemiological studies that dioxins are furans are immunotoxic. These compounds have also been found to cause developmental and reproductive toxicity in animals. Dioxin-like compounds have also been found to be genotoxic by activating gene transcription through aryl hydroxylase activity (AHH). TCDD, the most potent of all the dioxin congeners, has been shown to be a multisite carcinogen in both sexes of mice and in hamsters. It is believed that there are multiple mechanisms for TCDD's "tumor promoting" activity. The carcinogenic effects of TCDD are hepatocellular carcinomas and hepatocellular hyperplastic nodules.

Early life stages of animals have been shown to be more sensitive to TCDD than adult animals. Studies have shown that TCDD is directly toxic to pike, rainbow trout, lake trout, and Japanese medaka. The toxic effects on young fry of these fish species are edema, hemorrhage, arrested growth and development, and death. TCDD has been shown to be extremely toxic to bird eggs. *Signs of toxicity are species-specific*; however, embryo mortality is common to all species.

3.1.3.2 Potentially Affected Receptors

The categories of likely potentially affected receptors for an aquatic system such as the Dead Creek and the Borrow Pit include:

- the benthic macroinvertebrate community;
- warm water fish (e.g., largemouth bass);
- waterfowl (e.g., mallard) that feed on plants and macroinvertebrates (including shrimp);
- piscivorous birds (e.g., great blue heron, bald eagle);
- insectivorous birds that feed on hatched insects that were exposed to COPC in sediment in the larval stage;
- aquatic mammals (e.g., muskrat) that feed on plants and macroinvertebrates (including freshwater clams);
- aquatic mammals (e.g., river otter) that feed on fish and macroinvertebrates (including freshwater clams).

Section 3.2 provides more detail on these receptors.

The possibility for exposure of terrestrial plants and wildlife to COPCs in soil or through soil-based food chains was also considered in the evaluation. The categories of likely potentially affected terrestrial receptors include:

- terrestrial plants;
- soil invertebrates (e.g., earthworms);
- vermivorous mammals (e.g., short-tailed shrews)
- omnivorous or herbivorous mammals (e.g., white-footed mice);
- vermivorous birds (e.g., American woodcock).

These receptors were selected because they may be present in the Dead Creek floodplain and screening-level benchmarks are available for them. The benchmarks developed by Oak Ridge National Laboratory (Efroymson et al., 1997) were developed for plants, earthworms, and six additional species: short-tailed shrew, a vermivorous mammal; white-footed mouse, an omnivorous mammal; red fox, a carnivorous mammal; white-tailed deer, a herbivorous mammal; American woodcock, a vermivorous bird; and red-tailed hawk, a carnivorous raptor.

Efroymson et al. (1997) selected the lowest of these values which for wildlife represented the short-tailed shrew, white-footed mouse, and American woodcock. Screening values protective of these species will also be protective of the white-tailed deer and the carnivorous red fox and red-tailed hawk.

3.1.4 Complete Exposure Pathways

The USEPA guidance indicates that the risk assessment must identify complete exposure pathways before a quantitative evaluation of toxicity to allow the assessment to focus on COPCs that can reach ecological receptors. The likely complete exposure pathways in Dead Creek and the Borrow Pit Lake and the Dead Creek floodplain are:

Sediment to benthic invertebrates via direct contact and ingestion;

Sediment and surface water to aquatic plants via uptake;

Surface water to invertebrates and fish though direct contact and ingestion;

Benthic biota (including freshwater shrimp and clams) to higher order predators (e.g., fish) through the food chain;

Fish and macroinvertebrates (clams and shrimp) to piscivorous fish, mammals, or birds via ingestion;

Soil to soil invertebrates in the soils of the Dead Creek floodplain (including Sites G, H, I, L, and N) via direct contact and/or ingestion;

Soil to plants or wildlife in the Dead Creek floodplain (including Sites G, H, I, L, and N) via uptake through roots, direct ingestion, or ingestion via the food chain.

3.2 Identification of Receptors

This subsection of the ecological risk assessment identifies the receptors (receptor species) and provides the rationale for their selection as representative of the species that occur or are likely to occur near the site. This subsection also provides an ecological characterization of each receptor for use in developing the exposure assessment.

The selected receptors represent those types of organisms most likely to encounter the contaminants of concern at the site. They include a reasonable (although not comprehensive) cross-section of the major functional and structural components of the ecosystem under study based on:

Relative abundance and ecological importance within the selected habitats;

Availability and quality of applicable toxicological literature;

Relative sensitivity to the contaminants of concern;

Trophic status;

Relative mobility and local feeding ranges;

Ability to bioaccumulate contaminants of concern.

The selected species represent different feeding guilds. A guild is a group of animals within a habitat that use resources in the same way. Coexisting members of guilds are similar in terms of their habitat requirements, dietary habits, and functional relationships with other species in the habitat. Guilds may be organized into potential receptor groups. The use of the guild approach allows focused integration of many variables related to potential exposure. These variables include characteristics of COPCs (toxicity, bioaccumulation, and mode of action) and characteristics of potential receptors (habitat, range and feeding requirements, and relationships between species). This approach evaluates potential exposures by considering the major feeding guilds found in a habitat. It is assumed that evaluation of the potential effects of COPCs on the representative species will be indicative of the potential effects of COPCs to individual member classes of organisms within each feeding guild.

The selected species represent the ecological community and its sensitivity to the contaminants of concern and were arrived at based, in part, on knowledge of the area and on discussions with the USEPA and other government agencies.

3.2.1 Aquatic Habitat

The ecological receptors selected for evaluation in Dead Creek and Borrow Pit Lake include: benthic invertebrates, shellfish, local fin fish, tree swallow, great blue heron, mallard, bald eagle, muskrat, and river otter.

Benthic invertebrates

Benthic invertebrates are potential receptor species in Dead Creek and the Borrow Pit Lake because they:

Have the greatest exposure to sediments;

Provide food for bottom-feeding fish species;

Provide food for bottom-feeding fish species, insectivorous birds, and waterfowl;

Are relatively immobile (sessile) in habit, and therefore their general health and condition reflects local conditions.

Warm Water Fish Species

Warm water resident fish species were selected to reflect local sediment and water quality conditions. The typical warm water fish species such as centrachids (sunfish, bass) and bottom feeding fish such as bullheads are abundant local residents with a limited foraging range and are present in small ponds and borrow ponds throughout the region. These organisms are potential receptor species representing local fish because they are:

Resident in the Borrow Pit Lake;

Exposed to sediments as well as surface water;

Represent fish and higher order predators feeding on smaller fish and invertebrates.

Fish were abundant in the Borrow Pit Lake, but only a few small minnows were observed in Dead Creek Section F. Therefore, these receptors were evaluated in the Borrow Pit Lake only.

Aquatic Birds

We have selected tree swallow, great blue heron, mallard duck, and bald eagle to represent birds feeding on aquatic biota in Dead Creek and the Borrow Pit Lake for at least a portion of the time.

Tree Swallow (*Iridoprocne bicolor*)

Tree swallows are insectivores that consume flying insects. They feed over open or running water, and their diet consists almost exclusively of emergent adult forms of aquatic insects including Diptera, Hemiptera, Ephemeroptera, Zygoptera, Anisoptera, Plecoptera, and Trichoptera. Tree swallows will occasionally catch emerging insects directly from the water surface, but most insects are captured in flight. Tree swallows feed throughout the day, but the most intensive feeding occurs from late morning through late afternoon (Cohen, 1984).

These organisms are potential receptor species because they:

Consume aquatic insects that have been in contact with fish;

Have a foraging range smaller than the downstream area of the Dead Creek sectors;

Are a lower trophic level bird in the vicinity of the creek.

Tree swallows, therefore, represent insectivorous birds.

Great Blue Heron (*Ardea herodias*)

The great blue heron inhabits salt and freshwater environments, typically shallow waters and shores of lakes, flooded gravel pits, marshes and oceans. In marsh environments, the great blue heron is an opportunistic feeder; they prefer fish, but they will also eat amphibians, reptiles, crustaceans, insects, birds, and mammals. The diet varies but may include up to 100% fish. Great blue heron generally tend to forage near nesting sites (USEPA, 1993).

These organisms are potential receptor species because they:

Consume fish;

Have a foraging range about equal to the downstream area of the Dead Creek sectors;

Are a higher trophic level predator in the creek and Mississippi River.

Great blue heron, therefore, represent piscivorous birds.

Mallard (*Anas platyrhynchos*)

The mallard is the most common freshwater duck of the United States, found on lakes, rivers, ponds, etc. It is a dabbling duck, and feeds (usually in shallow water) by "tipping up" and eating food off the bottom of the water body. Primarily, it consumes aquatic plants and seeds, but it will also eat aquatic insects, other aquatic invertebrates, snails and other molluscs, tadpoles, fishes, and fish eggs. Ducklings and breeding females consume mostly aquatic invertebrates. The mallard's home range is variable, but an approximate range is 500 hectares. It prefers to nest on ground sheltered by dense grass-like vegetation, near the water.

Mallards are a potential receptor species because they:

Consume both aquatic plants and aquatic invertebrates;

Live on or near the water;

Are a lower trophic level duck in the creek and in the Mississippi River.

Mallards, therefore, represent waterfowl.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles are generally found in coastal areas or near lakes and rivers. Their preferred breeding sites are in large trees near open water. They are usually found in areas with minimal human activity. Bald eagles are federally-listed endangered species that overwinter in the Mississippi River valley north of Dead Creek and the Borrow Pit Lake. A pair of bald eagles was observed attempting to nest on the southern tip of Arsenal Island in 1993 and 1994. The nest has since blown down and has not been reconstructed (Collins, 2001). Two bald eagles were observed by USEPA and Illinois EPA representatives approximately 1 mile west of Dead Creek Section B and 0.5 miles east of the Mississippi River in late 1999. A bald eagle was also observed in the same location in December 2000.

Bald eagles, although primarily carrion feeders, are opportunistic and will eat whatever is plentiful including fish, birds, and mammals. Foraging areas vary according to season and location. The USEPA (1993) reports a foraging length of 2 to 4.5 miles along a river.

These organisms are potential receptor species because they:

Consume fish;

Are a higher trophic level predator;

Are sensitive to contaminants that biomagnify in the food chain.

The bald eagle, therefore, represents predatory birds.

Aquatic Mammals

This assessment assumes that river otter and muskrat represent aquatic mammals in Dead Creek and the Borrow Pit Lake.

River Otter (*Lutra canadensis*)

The river otter can be found in primarily freshwater but also saltwater environments, but seems to prefer flowing-water habitats rather than still water. It has been found in lakes, marshes, streams, and seashores. It consumes largely fish, but is opportunistic and will consume aquatic invertebrates (crabs, crayfish, etc.), aquatic insects, amphibians, birds (e.g. ducks), small or young mammals, and turtles. They may also sift through sediment for food. The otter dens in banks, in hollow logs, or similar burrow-like places. Home range varies depending on habitat and sex, but an approximate measure is 300 hectares (USEPA, 1993).

River otter were not observed during the wildlife surveys that at the site. However, river otters were selected as a receptor because of the concern given to them in Illinois (the Illinois Department of Natural Resources has released river otters trapped in Louisiana as part of a recovery program), their susceptibility to bioaccumulative COPCs, and the fact that the stream and wetland habitat of Dead Creek and Borrow Pit Lake could support river otter.

River otters are a potential receptor species because they:

Consume fish and aquatic invertebrates;

Live in or near the water;

Are a higher trophic level predator in the creek and in the Mississippi River.

River otters, therefore, represent higher trophic level aquatic mammal.

Muskrat (*Ondatra zibethicus*)

The muskrat is a semiaquatic large rodent which lives near freshwater and brackish aquatic environments: marshes, ponds, creeks, lakes, etc. Muskrat feed largely on aquatic plants, but depending on location and time of year may also consume aquatic invertebrates (crayfish, crabs, etc.), small amphibians, turtles, fish, mollusks, and even young birds (USEPA, 1993). The muskrat lives quite close to the water, either on the bank of the water body or in a lodge constructed in the water body. Muskrat tracks and dens were observed in and along the upper reaches of Dead Creek during the wildlife surveys. The home range of muskrat is small (0.17 hectares on average) and one study found that muskrats remain within 15 meters of their primary dwellings 50 percent of the time (MacArthur, 1978).

Muskrats are a potential receptor species because they:

Consume aquatic plants and aquatic invertebrates;

Live on or near the water;

Are a lower trophic level omnivore in the creek and Borrow Pit Lake.

Muskrats, therefore, represent lower trophic level aquatic mammals.

3.2.2 Terrestrial Receptors

The ecological receptors selected for evaluation in the Dead Creek floodplain include: plants, soil invertebrates, woodcock, short-tailed shrew, and white-footed mouse. These receptors were selected because screening-level soil benchmarks are available for them that were developed by Oak Ridge National Laboratory (Efroymson et al., 1997). Many of these receptors are present or likely to be present in the Dead Creek floodplain. In addition, these receptors were selected because they have a high exposure to soil via direct contact (plants and earthworms) or via ingestion of soil and earthworms (woodcock and short-tailed shrew) or plants (white-footed mouse).

Plants

Plants are potential receptors in the Dead Creek floodplain because they:

Are exposed to COPCs via direct root contact with soil and uptake of soil moisture through the roots;

Provide food for birds and mammals.

Soil invertebrates

Soil invertebrates are potential receptor species in the Dead Creek floodplain because they:

Have the greatest exposure to soil;

Provide food for birds and mammals;

Are relatively immobile in habit, and therefore their general health and condition reflects local conditions.

American woodcock (*Scolopax minor*)

Woodcock are a summer breeding species in Illinois. They inhabit woodlands and abandoned fields and feed mostly on soil invertebrates (predominantly earthworms). Because of their feeding method of probing soil for earthworms, they have a high percentage of soil in their diet (USEPA, 1993).

Woodcock are a potential receptor species in the Dead Creek floodplain because they:

Are likely to be present in and near the abandoned fields near the site;

Have a high exposure to soil contaminants via ingestion of earthworms and soil.

Woodcock, therefore, represent vermivorous songbirds.

Short-tailed shrew (*Blarina brevicauda*)

Shrews are ubiquitous and abundant in Illinois and can exist in almost any habitat (INHS, 1999). Short-tailed shrews generally consume insects, earthworms, slugs, and snails. If these are unavailable, they may substitute small mammals and plants. They burrow in and have close contact with soil.

Short-tailed shrew are a potential receptor species in the Dead Creek floodplain because they:

Are likely to be present in the Dead Creek floodplain;

Have a high exposure to soil via ingestion of soil and earthworms;

Have a high direct contact exposure to soil.

Short-tailed shrew, therefore, represent vermivorous small mammals.

White-footed mouse *(Peromyscus leucopus)*

White-footed mice can be found in brushy cleared areas and pastures and in streamside thickets. They eat mostly plant material, but can also eat insects and carrion (DeGraaf and Rudis, 1987).

White-footed mice are a potential receptor species in the Dead Creek floodplain because they:

Are likely to be present in the Dead Creek floodplain;

May be exposed to COPCs that have been taken up into plants.

White-footed mice, therefore, represent herbivorous small mammals.

4.0 SELECTION OF ASSESSMENT ENDPOINTS AND MEASURES OF EFFECTS

4.1 Assessment Endpoints

Assessment endpoints are expressions of the environmental value to be protected at a site. Assessment endpoints are often not directly measurable. Therefore, the assessment employs measures of effects. These are biological or measurable ecological characteristics which reflect the assessment endpoint (USEPA, 1997). Where the assessment endpoint is not directly measurable, the use of a measure of effect may result in some uncertainty in the risk characterization. Ultimately, the selection of assessment endpoints requires the consensus of the regulators, the regulated community, and state or local concerns. The following assessment endpoints were selected for this ecological risk assessment in the work plan (Appendix A):

> Sustainability (survival, growth, and reproduction) of warm water fish species typical of those found in similar habitats (incorporates the assessment of benthic macroinvertebrates). (Although this endpoint included crayfish in the work plan, this species was not observed in Dead Creek Section F or the Borrow Pit Lake. The field report (OBG, Inc., 2000) provides the details of these observations).
>
> Survival, growth, and reproduction of local populations of aquatic wildlife represented by tree swallow, mallard duck, great blue heron, muskrat, and river otter (incorporates the assessment of benthic macroinvertebrates including shrimp and clams).
>
> Survival, growth, and reproduction of individuals within the local bald eagle population that may overwinter near the site.
>
> Survival, growth, and reproduction of local populations of terrestrial wildlife along the banks and floodplain of Dead Creek.

The assessment will evaluate risk relative to these assessment endpoints in Creek Section F, the Borrow Pit Lake, and the floodplain.

4.2 Measures of Effects

The measures of effect direct data collection needs for the baseline ecological risk assessment. They provide the actual measurements for estimating risk. A weight-of-evidence approach (Menzie et al., 1996) weighs each of the measures of effects by considering:

> Strength of association between the measure of effects and assessment endpoint;

Data quality; and

Study design and execution.

Strength of association refers to how well a measure of effects represents an assessment endpoint. The greater the strength of association between the measurement and assessment endpoint, the greater the weight given to that measure of effect in the risk analysis.

The weight given a measure of effect also depends on the quality of the data as well as the overall study design and execution. The data developed in the QAPP/FSP and collected as described in the field sampling report (OBG, Inc., 2000) provides information to evaluate each selected measure.

There is considerable uncertainty associated with estimating risks, because ecological systems are complex and exhibit high natural variability. Measures of effect typically have specific strengths and weaknesses related to the factors discussed above. Therefore, it is common practice to use more than one measure of effect to evaluate each assessment endpoint.

The assessment endpoints and associated measures of effect are summarized in Table 4-1. The endpoints and measures of effect were modified slightly from the work plan to better represent species observed at the site.

4.3 Weight-of-Evidence Evaluation

A weight-of-evidence evaluation takes into account the strengths and limitations of different measurement methods and considers the logical relationships among them by considering:

1. the level of confidence, or weight, given to the various measures;
2. whether the result of the measurement indicates there is an effect;
3. the strength of the result, and
4. concurrence among the various measures.

Some measures address different aspects of the same assessment endpoint. In these cases, the measures are examined separately as well as collectively. This avoids the possibility that these measures would inappropriately cancel each other out if they yielded conflicting information. For example, the benthic invertebrate community was evaluated with regard to the prey base it provides for fish. Because this type of effect is different from a direct toxic effect of chemicals on fish, measures of the benthic community were also evaluated separately from measures of fish toxicity.

Actual field measurements have been given a medium to high weight because they represent quantifiable conditions at the site. Qualitative field observations such as species presence/absence have been given a low to medium weight. Although these observations provide information on site conditions, they are not quantifiable, and could vary depending on the time of year in which they occurred.

Many of the measures of effect used in this ecological risk assessment are a comparison to benchmark or literature-based values. These measures have been given a low to medium weight. Benchmarks and literature toxicity values represent potential effects based, for the most part, on laboratory studies, that may or may not relate to effects that may be in evidence in a field situation. Any screening level assessment (such as the comparison of soil concentrations to screening-level benchmarks) is given a low weight because of the high degree of conservatism built into such an assessment.

5.0 EXPOSURE ASSESSMENT

This section describes the data used in this ecological risk assessment and selects COPCs for assessment.

5.1 Data used in Ecological Risk Assessment

The chemical data for surface water, sediment, and floodplain soil that were used in this assessment were collected in 1999 specifically for this project. Some older soil data were used for Sites G, H, I, L and N. The 1999 data collection followed the Quality Assurance Project Plan/Field-Sampling Plan (QAPP/FSP) for the project (Ecological Risk Assessment Quality Assurance Project Plan Field Sampling Plan for Sauget Area 1, Prepared for Solutia, Inc., St. Louis, MO, Menzie-Cura & Associates, Inc., August 12, 1999). The QAPP included sampling and analysis for dioxin congeners, herbicides, metals, polychlorinated biphenyls (PCBs), organochlorine pesticides, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs). The field work was documented in:

> Soil, Ground Water, Surface Water, Sediment, and Air Sampling Field Sampling Report, Sauget Area 1, Remediation Technology Group, Solutia Inc., St. Louis, MO, O'Brien & Gere Engineers, Inc., September 2000.

The data and data validation were originally presented in:

> Sauget Area 1 Site, Support Sampling Project, Data Validation Report, Solutia Inc., St. Louis, MO, O'Brien & Gere Engineers, Inc., August 2000.

5.1.1 Sampling Locations

The chemical data used in this ecological risk assessment are by medium. The original sampling locations in the upstream reaches of Dead Creek presented a gradient of concentrations of various compounds. However, this assessment has been restricted to the farthest downstream portions of the creek, Section F and the Borrow Pit Lake.

Surface water: Surface water samples (designated "SW") were collected from Dead Creek Section F (3 samples), the Borrow Pit Lake (3 samples), and the reference areas (2 samples from each of two areas). Samples were co-located with surficial sediment samples collected for ecological risk assessment (designated "ESED"). These locations are shown on Figure 5-1 (Dead Creek and the Borrow Pit Lake), Figure 1-1 (reference area 1), and Figure 2-3 (reference area 2).

Sediment: Surficial sediment samples to be used for ecological risk assessment (designated "ESED" or "SED") were collected from depths of 0 to 2 inches from Dead Creek Section F (3 samples), the Borrow Pit Lake (3 samples), and the reference areas (2 samples from each of two areas). These sediment samples were co-located with surface water sampling locations. These locations are shown on Figure 5-2 (Dead Creek and the Borrow Pit Lake), Figure 1-1 (reference area 1) and Figure 2-3 (reference area 2).

An additional 37 sediment samples (designated "FASED") were collected from Dead Creek Section F and the Borrow Pit to evaluate the extent of migration of certain "industry specific chemicals". These samples were collected from the sediment surface to refusal (generally about 1 foot). These samples were only analyzed for petroleum hydrocarbons (TPH), total organic carbon, PCBs, copper, and zinc. Sample locations are shown on Figure 5-3. The TPH data were not presented or used here because TPH is a mixture of many compounds found in petroleum, and PAH and VOC data were available for ecological sediment samples.

Biota – Plants: Creeping buttercup (*Ranunculus reptans*) was selected as a target vegetation species due to its occurrence at many sample stations and its close proximity to surface water and exposed (dried) creek bed. This species was selected with the concurrence of Mr. Steve Broadhouse of Weston, the USEPA's oversight contractor. This species has a fleshy stem which would appear to make it appealing to herbivorous wildlife. It was the only vegetation observed in most sections of Dead Creek and the reference areas. No submerged or emergent vegetation was observed in Borrow Pit Lake. Two samples of creeping buttercup were collected from Dead Creek Section F (co-located with sediment sampling locations; Figure 5-4) and two samples were collected from the reference areas (also co-located with sediment sampling locations; Figure 1-1 and Figure 2-3). The entire plant was collected as a sample (rather than roots and stems separately) because the root system was very shallow and comprised a very small amount of the total plant mass. The plant was flowering at the time of sample collection so no seeds could be obtained. Two to four individual plants comprised a composite plant sample at each sampling station where plants were collected. A photograph of this species is in Appendix B.

Biota – Clams: Freshwater clams (*Pyganodon grandis*) were selected for analysis as macroinvertebrates because they are abundant in the Borrow Pit Lake and the reference areas. These clams are large (approximately 6 inches in diameter) and provide food for wildlife such as muskrat and river otter. Three composite freshwater samples were collected from the Borrow Pit Lake (Figure 5-4) and three composite samples were collected from the reference areas (Figures 1-1 and 2-3). Two to four individuals made up each composite. A photograph of this species is in Appendix B.

Biota – Shrimp: The work plan called for the collection of crayfish, but none were observed during the site reconnaissance or during the main sampling event. Traps were set overnight for crayfish during the site reconnaissance and none were caught. It is likely that the substrate of Dead Creek and the Borrow Pit Lake is too silty and muddy to support crayfish. During the main sampling event the abundance of the shrimp species (*Palaemonetes kadiakensis*) was observed in Borrow Pit Lake and the reference areas. This species was substituted for crayfish because it is a decapod and would be a ready substitute for crayfish in the diet of wildlife. In particular, dabbling waterfowl and other water birds would be expected to consume shrimp. A photograph of this species is in Appendix B. One composite shrimp sample was collected from the Borrow Pit Lake and two composite samples were collected from the reference areas. The composites comprised many individuals and varied in total weight from 74 to 89 grams.

Biota – Fish: Fish were abundant in the Borrow Pit Lake but very few small minnows were present in Dead Creek Section F. The habitat and morphology of Dead Creek Section F were different from both the Borrow Pit Lake and the rest of Dead Creek, and although up to a foot of water was present in the portion of Section F upstream of the Borrow Pit, no fish were observed there. Whole bodies were analyzed for use in the ecological risk assessment. The data used in this risk assessment include: three composite largemouth bass samples from the Borrow Pit Lake and two each from each of the two reference areas; three composite brown bullhead samples from the site and three from the reference areas; and three composite forage fish samples from the site and three from the reference areas. Table 5-1 summarizes the number of fish per composite sample.

Soil: Surficial floodplain soil samples were collected from depths of 0 to 6 inches from developed (designated "DAS") and undeveloped (designated "UAS") areas. Sample locations are shown on Figure 5-5. Background soil samples (designated "BS") are also shown on Figure 5-5. The background soil locations were selected and approved during discussions with USEPA representatives during the development of the Site Sampling Plan. Soil samples are not available for the 6 inch to 24 inch interval which could also be an exposure medium for ecological receptors (in particular, invertebrates and burrowing mammals). The background surface soil samples were collected near the three groundwater monitoring wells used to evaluate upgradient groundwater conditions. These wells are on the east (upgradient) sides of Sites I, H, and L.

Four surface soil samples (0 to 6 inches) were collected from each of Sites G, H, I, L, and N. These Sites are shown on Figure 5-5. The only existing subsurface soil data for these areas were available from historical sources. These data were obtained from the following: Sauget Area 1 Data Tables/Maps, ecology and environment, inc., February 1998, prepared for USEPA Region 5 Office of Superfund, Chicago, IL, ARCS Contract No. 68-W8-0086, Work Assignment No. 47-5N60. The historical data are unvalidated, and detection limits were not available for the majority of results reported as not detected. Therefore, only results reported as detected were used in this evaluation. Any sample for which all results were reported as not detected was eliminated from further evaluation. Samples used in the subsurface soil evaluation are presented in Appendix C. Many of these subsurface samples came from depths greater than 2 feet. However, since these were the only subsurface data available for these areas, they were used in the screening level analysis.

The summary statistics for these data (by medium and site location or reference area) are presented in Appendix C.

5.1.2 Calculation of Summary Statistics

The data for each area and medium were summarized for use in the risk assessment. The steps used to summarize the data by area and medium are:

Treatment of Duplicates

Data for samples and their duplicates were averaged before summary statistics were calculated, such that a sample and its duplicate were treated as one sample for calculation of summary statistics (including maximum detection and frequency of detection).

Treatment of Non-Detects

Summary statistics were not calculated for constituents that were not detected in a particular area/medium. (For example, Dead Creek Section F sediment represents an "area/medium").

Where constituents were detected in some samples and not in others in a particular area/medium, one half the reported sample quantitation limit (SQL) was used to represent the concentration for the samples reported as nondetect.

For non-detects for which one half the SQL was calculated, one half the SQL was compared to the maximum detected concentration for that area and medium. Where one half the SQL was greater than the maximum detected concentration in a particular area/medium, the SQL value was not used in the calculation of summary statistics for that constituent in that area and medium.

Frequency of Detection

The frequency of detection is reported as a percentage based on the total number of samples analyzed and the number of samples reported as detected for a specific constituent. The number of samples used to calculate statistics reflects the treatment of non-detects described above.

Minimum Detected Concentration

This is the minimum detected concentration for each constituent/area/medium combination, after duplicates have been averaged.

Maximum Detected Concentration

This is the maximum detected concentration for each constituent/area/medium combination, after duplicates have been averaged.

Average Concentration

This is the arithmetic mean concentration for each constituent/area/medium combination, after duplicates have been averaged and non-detects have been evaluated.

For most of the samples used in the ecological risk assessment, there were too few data to calculate a 95% upper confidence limit (UCL) on the mean, so the concentrations used in calculations were either the maximum concentration in that area/medium or the average concentration. For surficial floodplain soil, sufficient data were available to calculate a 95% UCL.

The equation used to calculate the 95% UCL is dependent upon the distribution of the data set. If data are normally distributed, the following equation is used (USEPA, 1992a):

$$95\%\ UCL = \bar{x} + t(s / \sqrt{n})$$

where:

$\bar{x}$	=	mean of data
s	=	standard deviation of the data
t	=	student t-statistic
n	=	number of samples

If the data are lognormally distributed, the 95% UCL is calculated using the transformed data set and the H-statistic (USEPA, 1992). The data are "transformed" by using the natural logarithmic function, i.e., by calculating ln(x) for each x value in the data set.

$$e^{(\bar{x} + 0.5s^2 + sH / \sqrt{n-1})}$$

where:

e	=	base of the natural log, equal to 2.718
$\bar{x}$	=	mean of the transformed data
s	=	standard deviation of the transformed data
H	=	H-statistic
n	=	the number of samples in the population

H-statistic and t-statistic values were obtained from Gilbert (1987).

The Shapiro-Wilk Test for Normality (W-test) is used to whether the transformed or the non-transformed 95% UCL better represents the data. The results of the W-test indicate whether the data set is more likely to be normally or lognormally distributed. The UCL based on the student t-statistic is selected where the data set is more likely to be normally distributed, while the UCL based on the H-statistic is selected where the data set is more likely to be lognormally distributed. The W-test values were calculated and compared for the log-transformed and untransformed data sets. If the log-transformed data have the higher W-test value, the data are assumed to be more lognormally distributed, and the H-statistic 95% UCL value is the appropriate UCL. Similarly, if the untransformed data have the higher W-test value, the data are assumed to be more normally distributed, and the t-statistic 95% UCL is the appropriate UCL.

Appendix C presents the summary statistics by area and medium.

5.1.3 Calculation of PCB and dioxin/furan concentrations

Samples were analyzed for PCB homologs, and polychlorinated dioxin and polychlorinated furan congeners. PCBs, dioxins, and furans are complex mixtures of individual congeners that have different volatilities, solubilities, and rates of biodegradation and metabolism as well as different toxicities. This section discusses how these data were handled in this ecological risk assessment.

Total PCBs were calculated by summing the concentration of the detected homologs and one half the detection limit for homologs that were not detected. If a homolog was never detected in any sample in a particular medium or area, it was not included in the total. Only two out of ten homologs, hexachlorobiphenyl and pentachlorobiphenyl, were detected in ecological sediment samples and most site biota. An additional two homologs, heptachlorobiphenyl and tetrachlorobiphenyl, were detected only in largemouth bass tissue at the site. Additional homologs were detected only in the "industry specific" sediment samples (decachlorobiphenyl, nonachlorobiphenyl, octachlorobiphenyl, and trichlorobiphenyl).

Polychlorinated dioxin and polychlorinated furan congeners were evaluated collectively as a dioxin Toxic Equivalency Quotient (TEQ). 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is the most potent of a group of compounds that bind to an intracellular protein called the aryl hydrocarbon receptor (AhR). Other dioxin congeners also bind to this receptor and have been shown to exert toxic responses similar to those exerted by TCDD. The biological activity of these compounds seems to correlate with their binding affinity to this receptor (WHO, 1998). *The toxic equivalency quotient (TEQ) approach was developed to represent the fractional* toxicity of dioxin congeners relative to TCDD. TEQs are calculated as follows:

$$TEQ = \Sigma[\ (\text{Dioxin-like Congener Concentration})_i \cdot TEF_i]_n$$

where,

TEF = toxic equivalency factor for congener i, and
n = number of dioxin-like congeners in the mixture of concern.

Toxic equivalency factors (TEFs) for each dioxin-like congener are available for mammals (the same values used for humans), birds, and fish to account for differing wildlife sensitivities (Van den Berg et al., 1998).

TEQs for dioxins were calculated for each medium by multiplying the detected concentration (or half the detection limit) of each by its TEF and adding the products to obtain the dioxin TEQ. *If a congener was never detected in a particular medium or area, it was not included in* the total. Data designated with an "M" in the data validation to indicate "estimated maximum potential concentration" were also treated as not detected. According to the laboratory, an "M" is used to indicate that the information for the peak meets some but not all of the criteria required to establish a positive identification, i.e., not only is the quantitation estimated, but the identity of the constituent is also estimated. In the data validation process, the "M" qualified data were qualified as "U," or not detected, at the reported concentration because there was not a conclusive constituent identification.

5.1.4 COPC Selection Process

In this assessment, COPCs are selected for surface water, sediment, and biota. The selected COPCs are then carried through the ecological risk assessment.

The screening level evaluation for soil is in itself a comparison to benchmarks. Compounds with concentrations above soil benchmarks will not be carried through a baseline ecological risk assessment at this time. Therefore, the selection of COPCs does not address soil.

The selection of COPCs for ecological risk assessment was a multi-step process. The first step was comparison of combined surface water and sediment data to published benchmarks. Table 5-2 compares the maximum concentration detected in surface water of Dead Creek Section F and the Borrow Pit Lake to Illinois Surface Water Quality Standards (Illinois, 1999), National Recommended Water Quality Criteria (USEPA, 1999a), Great Lakes Initiative Tier II Water Quality Guidelines (summarized in Suter and Tsao, 1996), and other water quality guidelines assembled by Suter and Tsao (1996). Precedence was given to these standards and guidelines in the order given. If multiple values were available for a compound, the Illinois value superceded the national value, which superceded the Great Lakes value. Compounds that exceeded the corresponding benchmarks or for which no benchmark was available were retained as COPCs.

Table 5-3 compares maximum sediment concentrations for Dead Creek Section F and the Borrow Pit Lake to consensus-based sediment quality guidelines for freshwater developed by MacDonald et al. (2000), Florida sediment quality guidelines (MacDonald, 1994), and Ontario Sediment Quality Guidelines (Persaud et al., 1993). The use of these guidelines for ecological screening was recommended by Scott Cieniawski of USEPA Region 5. If the concentration exceeded any of the benchmark values, or no benchmarks value was available, the compound was retained as a COPC.

Compounds considered non-toxic (calcium, magnesium, sodium, and potassium) were not included as COPCs. In addition, two compounds were excluded as COPCs because they were detected at a very low overall frequency (ethylbenzene was detected in one sediment sample out of six at 11 ug/kg and in no other medium; 2,4-dimethylphenol was detected in one of two plant samples at 51 ug/kg and in no other medium). Ethylbenzene was not detected in upstream sediment (Sectors B, C, D, and E) and surface water (Sectors B, D, and E) samples. 2,4-dimethylphenol detected only once in an upstream plant sample in Sector B. Phenolic compounds (Salisbury and Ross, 1992) are naturally produced by plants.

As a final screen for COPCs presented on Table 5-4, additional compounds were retained as COPCs that were detected in site biota, but that had not been detected in surface water and sediment.

The resulting COPCs for ecological risk assessment in Dead Creek are: 2,4-D, 2,4-DB, dicamba, dichloroprop, MCPA, MCPP, pentachlorophenol, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, iron, fluoride, lead, manganese, mercury, molybdenum, nickel, selenium, silver, vanadium, zinc, total PCBs, total DDT, aldrin, alpha-chlordane, delta-BHC, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, endrin aldehyde, endrin ketone, gamma chlordane, gamma-BHC, heptachlor, heptachlor epoxide, methoxychlor, acenaphthalene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, dibenzo(a,h)anthracene, diethylphthalate, fluoranthene, indeno(1,2,3-c,d)pyrene, and dioxin calculated as the toxicity equivalent of 2,3,7,8-TCDD. Note that total concentrations of DDT and PAHs were calculated as the sum of the concentrations of individual compounds detected in that sample using one half the detection limit for compounds not detected in that sample but detected in that medium and at that location.

5.1.5 Data Quality

To evaluate the quality of the data for ecological risk assessment, detection limits were compared to screening benchmarks to evaluate data quality objectives. These comparisons are presented in Appendix C and discussed below.

Surface Water

Table C-1-9 compares surface water detection limits to screening benchmarks. Detection limits were higher than screening benchmarks for beryllium, cadmium, total cyanide, selenium, PCBs, 11 pesticides, three PAHs, dibenzofuran, and three VOCs. Of these compounds, cadmium, selenium, PCBs, 8 pesticides, and benzo(a)pyrene were included as COPCs due to their detection in other media. There is some uncertainty in the overall analysis because these compounds could be present in surface water at a low concentration that exceeds a screening benchmark. The organic compounds, however, have very low solubility and are not expected to be present in surface water.

Sediment

Table C-2-11 compares detection limits for ecological sediment samples to screening benchmarks. Detection limits were below screening criteria or screening criteria were not available for most of the analytes in sediment. The exceptions are discussed here.

Detection limits for total cyanide, 14 PAHs, bis(2-ethylhexyl)phthalate, and hexachlorobenzene exceeded sediment screening levels. These compounds were not detected in ecological sediment samples. Of the compounds mentioned above, six PAHs and bis(2-ethylhexyl)phthalate were selected as COPCs because they were detected in another medium. There is some uncertainty in the overall analysis because these compounds could be present in sediment at a low concentration that exceeds a screening benchmark.

The detection limits for silver, total PCBs, and 10 pesticides exceeded screening criteria in some samples. These compounds were detected in at least one sample, and with the exception of beta-BHC and endrin, were included as COPCs. Therefore, uncertainty due to detection limits for these compounds is limited.

"Industry Specific" Sediment Samples

Tables C-2-12 and C-2-13 compare detection limits for the "industry specific" sediment samples to screening benchmarks for Dead Creek Section F and Borrow Pit Lake, respectively. Detection limits for PCBs exceeded the lowest screening benchmarks used to select COPCs, but not the TEC or LEL. Since PCBs were not screened out as COPCs in the "industry specific" sediment samples, there is little uncertainty resulting from these detection limits.

Surface Soils from Developed and Undeveloped Areas

Table C-4-12 compares the highest detection limit in Dead Creek floodplain soil (UAS and DAS samples) to screening benchmarks. Screening benchmarks for soil were available for few compounds detected in this medium. Detection limits exceeded soil screening benchmarks for selenium and thallium. The resulting uncertainty due to this assessment is slight because the highest detection limit for selenium, 1.3 mg/kg, is within the range of background for soil in Illinois (IEPA, 1994). The highest detection limit for thallium, 1.3 mg/kg, exceeds the screening benchmark of 1 mg/kg slightly and does not introduce much uncertainty into the assessment.

Surface Soils from Sites G, H, I, L, and N

Table C-4-13 compares the highest detection limit in surface soils from Sites G, H, I, L, and N to screening benchmarks. Screening benchmarks for soil were available for few compounds detected in this medium. Detection limits exceeded soil screening benchmarks for selenium and thallium, and the detection limit for some PCB homologs exceeded the benchmark for total PCBs. The highest detection limit for selenium, 1.2 mg/kg, is within the range of background for soil in Illinois (IEPA, 1994). The highest detection limit for thallium, 1.2 mg/kg, exceeded the screening benchmark of 1 mg/kg slightly. Although the detection limit for some PCB homologs exceeded the screening benchmark for PCBs, other homologs had detection limits below the benchmark. Therefore, the little uncertainty in the analysis results from these detection limits.

6.0 ECOLOGICAL EFFECTS ASSESSMENT

The effects assessment summarizes and weighs available evidence regarding the potential for contaminants to cause adverse effects. These adverse effects may include impacts on growth, reproduction, and survival. The general approaches used to assess ecological effects are summarized below. Additional details are provided in the following sections.

6.1 General Approach for Assessment of Ecological Effects

Various approaches are used to assess risk to ecological receptors. These individual lines of evidence are evaluated to provide an overall weight of evidence regarding risk.

In the aquatic portion of the assessment, these include for benthic invertebrates and fish:

- Comparison of concentrations of COPCs in sediment and surface water to established benchmarks;
- *Evaluation of sediment toxicity data;*
- Analysis of benthic community structure; and
- Comparison of concentrations of COPCs in tissue to toxicity reference values (TRVs) that have been reported to cause adverse effects in similar organisms.

For aquatic wildlife (birds and mammals), the approach is:

- Comparison of estimated dietary doses to TRVs that have been reported to cause adverse effects in similar organisms. The assessment also uses observations of wildlife and habitat that have been made during several site visits to Dead Creek and the Borrow Pit Lake.

For terrestrial receptors, the approach is a screening level assessment that compares soil concentrations to available benchmarks for the protection of plants, soil invertebrates, and terrestrial wildlife.

6.2 Sediment and Surface Water Benchmarks

Concentrations of COPCs in individual sediment and surface water sampling locations are compared to benchmarks to assess the potential risk of adverse impacts to aquatic organisms, including invertebrates and fish. These benchmarks are described in this section.

6.2.1 Sediment Benchmarks

The sediment benchmarks used for sediment were the lower of the freshwater Threshold Effect Concentrations and Probable Effects Concentrations developed by MacDonald et. (2000) and the Ontario Ministry of the Environment Sediment Quality Guidelines (Persaud et al, 1993). Note that exceeding these benchmarks is an indication of possible effects to benthic invertebrates, but does not indicate that effects are expected to occur.

Threshold Effect Concentrations and Probable Effects Concentrations

MacDonald et al. (2000) evaluated previously existing sediment quality guidelines for freshwater ecosystems. Based on the strengths and weakness of each type of sediment quality guideline, they selected consensus-based criteria applicable to freshwater systems. They also evaluated the predictive ability of these guidelines. Their Threshold Effects Concentrations (TEC) represent concentrations below which harmful effects to benthic biota are unlikely to occur. Their Probable Effects Concentrations (PEC) represent concentrations above which harmful effects to biota are likely to be observed.

Ontario Ministry of the Environment Sediment Quality Guidelines

The Ontario Ministry of the Environment (Persaud et al., 1993) developed Lowest Effect Levels (LEL) and Severe Effect Levels (SEL) for freshwater ecosystems. According to the authors, the Lowest Effect Level indicates a level of contamination which has no effect on the majority of the sediment-dwelling organisms, and the Severe Effect Level represents a level at which the sediment is considered likely to affect the health of sediment-dwelling organisms.

6.2.2 Surface Water Benchmarks

The primary benchmarks used for surface water were the Illinois Surface Water Quality Standards. These were selected as most appropriate for Illinois waters. If a state value was not available, the benchmarks used in order of priority were National Recommended Water Quality Criteria, Great Lakes Water Quality Initiative Tier II Criteria, and other benchmarks developed by Oak Ridge National Laboratory (Suter and Tsao, 1996).

Illinois Surface Water Quality Standards

Illinois Surface Water Quality Standards were selected as the primary benchmarks. According to the Clean Water Act Section 304, States are allowed to establish their own criteria different from federal criteria that take into account site specific conditions or use other scientifically defensible methods. Therefore, these standards were selected as most appropriate for Illinois waters. Where appropriate, they were adjusted for the average water hardness of the water body.

National Recommended Water Quality Criteria

National Recommended Water Quality Criteria (NRWQC) were developed under the Clean Water Act Section 304 for the protection of aquatic life for both freshwater and saltwater environments (USEPA 1999a). Development of these criteria requires results of at least eight acute toxicity tests from eight different families and three chronic tests. For metals, some AWQC are based on concentrations in the dissolved phase, rather than total concentrations, because dissolved metal concentrations more closely approximate the bioavailable fraction of metal in the water column. The surface water samples collected from Dead Creek, Borrow Pit Lake, and the reference water bodies were analyzed for total metals; therefore, the criteria were adjusted accordingly. Also, where appropriate, the criteria were adjusted to the average water hardness of the water body.

Great Lakes Water Quality Initiative Tier II Criteria

Tier II values were developed for the Great Lakes Basin; fewer toxicity test data are required to establish these criteria than for the NRWQC (USEPA, 1995). The Tier II Values are concentrations that would be expected to be higher than NRWQC in no more than 20% of cases.

Oak Ridge National Laboratory Surface Water Guidelines

Suter and Tsao (1996) developed alternative benchmarks from the toxicity literature for some compounds that do not have other criteria. These have been used if no other benchmark is available.

6.3 Sediment Toxicity Data

The measures of effects on benthic invertebrates included acute and chronic toxicity tests with two freshwater species at each sediment triad station including the reference areas. Ten-day acute toxicity tests were run with the amphipod *Hyalella azteca*. These tests measured survival and growth. A 42 day chronic survival, growth and reproduction toxicity bioassay was also run with this species at each location. A 10 day acute toxicity text that measured growth and survival was performed with a Chironomid larvae *Chironomus tentans* at each sediment triad sampling location. A 20 day chronic survival, growth, emergence, and reproduction toxicity bioassay was also run with each sediment sample for which survival was high enough to continue the test beyond 10 days. These tests were performed by Aquatec Biological Sciences of South Burlington, Vermont. Their laboratory reports are in Appendix E.

6.4 Benthic Community Structure

The structure of the benthic community is analyzed using several approaches that examine whether the COPCs in Dead Creek Section F and the Borrow Pit Lake may be exerting stress on benthic invertebrates. These include benthic community metrics that analyze abundance of individuals and diversity of species.

The results of these analyses are included in the weight-of-evidence analysis to assess impact at each sediment triad sampling location. The results are examined in comparison to factors that could influence benthic community structure such as concentrations of COPCs, sediment grain size and organic carbon content.

Descriptions of the various approaches to analyzing benthic community structure are provided in the following sections.

A number of different measures of benthic community health and diversity are used in this assessment which assesses numbers of benthic invertebrates at Dead Creek Section F, the Borrow Pit Lake, and reference areas.

- Abundance is a direct count of the number of individual organisms. The number of individuals is a measure of the "standing stock" of the benthic community and provides an indication of the ability of the benthic community to serve as a prey base for higher trophic levels.

- Taxa richness is a count of the number of different taxa (in most cases taxa are counted at the level of the species). The assumption is that high diversity is indicative of a benthic community with a greater diversity of microhabitats and a broader range of species with varying tolerances to physical, biological, and chemical interactions.

- The Shannon-Weiner Diversity Index (H') provides another useful comparative measure of benthic community structure (Begon et al., 1990; Gallagher, 2000). The index is species-based and assesses diversity using both the number of species (species richness) and the number of individuals (abundance) per species. Although more complex statistical testing can be employed to compare H' statistics, generally the greater the Shannon-Weiner Diversity Index, the greater the diversity of benthic species at a station.

  The Shannon-Weiner Index is calculated as follows:

$$H' = -\sum_{i}^{S} p_i \log p_i$$

Where,

p_i = frequency of species i in the sample = $\frac{N_i}{N}$

N_i = number of individuals of species i
N = total individuals in sample
S = number of species

- Simpson's Index

Simpson's index is a comparative measure of diversity that addresses species evenness. The Simpson's index of a benthic community sample is indirectly proportional to the heterogeneity of the community and will range between 0 and 1. Statistically, Simpson's index is a measure of the probability of two randomly selected organisms belonging to the same species (Cole, 1994). Samples in which a large proportion of individuals belong to a small number of species will have a high Simpson's index while a sample with individuals more evenly distributed among species will have a lower Simpson's index. The formula used to calculate Simpson's index, taken from Cole (1994) is:

$$\lambda = \Sigma\, p_i^2$$

Where,

p_i = the frequency of species i in the sample.

- Modified Hilsenhoff's Biotic Index

Hilsenhoff's biotic index (HBI) is a species-specific community index which measures the proportion of species which are tolerant to disturbance. The underlying assumption of the HBI is that species deemed sensitive to disturbance decrease in abundance as disturbance to the community increases. Species specific tolerance values, taken from Barbour, et al. (1999), range from zero (extremely sensitive) to ten (tolerant), and are multiplied by the relative abundance of each species within a sample. The resulting values are summed to produce a single tolerance value for each sample. In cases where tolerance values were not available for a species, the tolerance value for the next taxonomic level was used, typically a single tolerance value for the entire genus. In general, the higher the tolerance value assigned to a benthic community, the greater the degree of impairment.

6.5 Toxicity Reference Values for Tissue Concentrations in Fish

Toxicity Reference Values for aquatic life are based on critical body burdens or concentrations of COPCs in animal tissues that correspond with toxicological effects. Comparison of actual measured tissue concentrations to critical body residues is a more direct and less uncertain measure of effect than are comparisons to water or sediment concentrations, which are often used as a surrogate for the concentration a the actual site of toxic action. Concentrations measured in samples of forage fish, largemouth bass, and brown bullhead are compared to these values to assess the potential for risk of harm to fish exposed to COPCs in the Borrow Pit Lake.

The US Army Engineer Waterways Experiment Station (WES), the research and development branch of the US Army Corps of Engineers, has developed the Environmental Residue Effects Database (ERED) (USACE, 2001). ERED compiles reports from the literature on adverse effects of COPCs based on whole body concentrations of COPCs in aquatic life. WES conducts a quality control review on entries and updates the database annually. A similar database compiled by US EPA (Jarvinen and Ankley, 1999) was also used. This ecological risk assessment uses both sources for development of toxicity reference values for fish.

Studies that examined effects on growth, survival or reproduction were selected for development of body burden toxicity reference values. If more than one appropriate study was available, the lowest of the lowest observed effects levels (LOAEL) and corresponding no observed effects level (NOAEL) were selected. Table 7-4 presents the test species, residue effect level, literature reference, and value selected.

6.6 Toxicity Reference Values for Dietary Doses to Birds and Mammals

The chronic NOAELs and LOAELs for the wildlife species are based on the results of laboratory studies reported in the literature. The NOAEL is the highest concentration of a particular contaminant at which no adverse effects are observed in the test species. The LOAEL is the lowest concentration of a particular contaminant at which adverse effects are observed in the test species. NOAELs and LOAELs are daily doses of chemicals (mg chemical consumed/kg body wt/day) which are compared to the exposure doses (mg/kg/d) calculated in the food chain models in Appendix F.

Sources of the chronic NOAEL and LOAEL doses for avian and mammalian species include Sample et al. (1996) and other sources. Values available in Sample et al. (1996), were preferred. If avian doses were not available in Sample et al. (1996), the USEPA ECOTOX on-line database and/or the scientific literature were searched. For those mammalian doses not available in Sample et al. (1996), the latest versions of toxicological profiles compiled by the Agency of Toxic Substances and Disease Registry (ATSDR), the USEPA Integrated Risk

Information System (IRIS), and/or scientific literature were searched for appropriate mammalian NOAEL and LOAEL doses.

NOAEL doses and LOAEL doses were taken from studies that met the following criteria:

- Close taxonomic relationship between the test species and the receptor species;
- Ecologically relevant endpoints – Endpoints, such as reproduction, development, growth, and mortality, were chosen because they can lead to population-level effects;
- Appropriate exposure duration –Chronic studies were considered to be longer than 70 days for birds and 1 year for mammals or for shorter periods during critical life stages;
- Appropriate exposure route – Studies in which the test species received the chemical dose by the diet were preferred to those that in which the test species received an oral capsule or by gavage. However, for some chemicals, the only data available are gavage.

If only subchronic studies were available for selecting chronic NOAELs or LOAELs, an Acute to Chronic Ratio of 10 (Sample et al., 1996) was applied. If only a LOAEL was provided by the authors of the selected study, then the LOAEL was divided by a factor of 10 to derive the NOAEL benchmark. The resulting NOAEL and LOAEL doses are presented in Appendix F.

6.7 Benchmarks for Evaluating Soil Toxicity

Oak Ridge National Laboratory (Efroymson et al., 1997a) has developed preliminary remediation goals for soils based on toxicity to plants, soil invertebrates, and uptake into the food chain and subsequent effects on wildlife. The benchmarks for plants and earthworms were selected from literature data on field or laboratory studies (Efroymson et al., 1997b,c). The wildlife values were calculated using a food chain model for short-tailed shrew, white-footed mouse, red fox, white-tailed deer, American woodcock, and red-tailed hawk. They used the LOAEL values from Sample et al. (1996) and uptake factors (into plants, earthworms, and small mammals) from Efroymson et al. (1997), and Sample et al. (1997a,b). They then selected the lowest of the plant, earthworm, and wildlife values as a soil benchmark.

7.0 RISK CHARACTERIZATION

This section describes the measures of effect for each assessment endpoint, the data collected as part of those measures, and analyses performed with those measures to evaluate each assessment endpoint

7.1 Assessment Endpoint 1; Sustainability of Warm Water Fish

The COPCs may exert direct effects on warm water fish through exposure in the water, sediment, or prey, and indirectly by affecting their prey, the macroinvertebrate community. The associated measures of effects assess exposure pathways and potential effects. Some rely upon direct observations of conditions; some involve measures of toxicity; and others use literature values.

7.1.1 Measure of effect 1a: body burdens of COPCs in selected fish species

Purpose and Rationale. Fish exposed to bioaccumulative compounds in their diet or in water can accumulate these COPCs in their tissues. Contaminants tend to accumulate in organs such as the liver and kidney to a greater degree than in the musculature. However, COPC levels in tissue on a whole body basis are useful for evaluating risks to animals that eat fish. The assessment uses measurements of COPCs in fish tissue to evaluate exposure and effects on the fish, and to provide data for use in other parts of the assessment.

Approach. The assessment uses this endpoint to evaluate effects as a measure of effects, the assessment compares measured body burdens to literature values at which effects have been reported. The assessment will also use the body burden data in subsequent sections as input to the food chain exposure models for the representative piscivores (the great blue heron, bald eagle, and river otter).

Evaluation: Tables 7-1, 7-2 and 7-3 present concentrations detected in largemouth bass, brown bullhead, and forage fish (small minnows), respectively, from the Borrow Pit Lake and concentrations detected in these species in reference areas. Compounds detected in Borrow Pit Lake fish were: dicamba, MCPA, aluminum, chromium, copper, mercury, selenium, zinc, total PCBs, DDE, gamma chlordane, heptachlor, di-n-butylphthalate, and 2,3,7,8-TCDD TEQs in largemouth bass; dichloroprop, aluminum, chromium, copper, lead, mercury, zinc, total PCBs, DDE, alpha chlordane, gamma chlordane, heptachlor, bis(2-ethylhexyphthalte, diethylphthalate, and 2,3,7,8-TCDD TEQs in brown bullhead; and 2,4-DB, dicamba, dichloroprop, MCPA, pentachlorophenol, aluminum, chromium, copper, lead, mercury, selenium, zinc, total PCBs, DDE, bis(2-ethylhexyl)phthalate, diethylphthalate, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and 2,3,7,8-TCDD TEQs in forage fish (minnows).

Table 7-4 presents NOAEL and LOAEL concentrations in fish tissue from the literature. Where the information is available, NOAEL and LOAEL concentrations have been selected for effects on mortality, growth, and reproduction or development. Tables 7-1, 7-1, and 7-3 also compare these values to the maximum concentration detected in site fish.

The only COPC for which a NOAEL or LOAEL body burden is exceeded in site fish is mercury. The maximum mercury concentration (0.26 mg/kg wet weight) but not the average mercury concentration in brown bullheads slightly exceeded the benchmark of 0.25 mg/kg mercury wet weight. This was due to one composite brown bullhead sample. The other two brown bullhead samples had lower mercury concentrations (0.05 and 0.075 mg/kg wet weight). The maximum mercury concentration in forage fish samples (0.6 mg/kg wet weight) also exceeded the benchmark, but the average concentration did not. This was also due to the concentration in one composite sample. The concentrations in the two other samples were 0.052 mg/kg wet weight and not detected at a detection limit of 0.1 mg/kg wet weight Largemouth bass concentrations did not exceed any of the available benchmarks. Note that body burden benchmarks were not available for all COPCs detected in fish.

The benchmark value of 0.25 mg/kg wet weight represents a no observed effects concentration for mortality, but a lowest observed effects concentration for reproductive effects (Friedmann et al., 1996). In a feeding study with walleye, a predatory fish, using low and high doses of methylmercury, Friedmann et al. (1996) found that ingestion of methylmercury in prey resulted in an inhibition of growth, testicular development, and immune function. The resulting body burdens from both the low and high methylmercury level diets were associated with these effects. The body burden associated with the low dietary level was 0.25 mg/kg mercury wet weight. Walleye with body burdens at this level exhibited the effects described above, but not mortality. Friedmann et al. point out that a concentration of 0.25 mg/kg mercury wet weight is within the range of mercury concentrations typically detected in North American fish. They gave a range of 0.03 to 0.7 mg/kg mercury (wet weight) in the Northeastern United States and Canada.

The USEPA (1999b) nationwide database on total mercury concentrations in fish tissue contains information on mercury concentrations in fish tissue in Illinois. Most of the samples collected in Illinois are composites of 2 to 5 fish fillets of several species collected in various lakes and rivers in the upper Mississippi River basin from 1990 to 1993. A total of 85 samples were collected in these lakes and rivers. For the fish species in water bodies in the upper Mississippi River basin in Illinois, the concentration of total mercury in composite fillets ranged from less than 0.010 mg/kg (wet weight) to 0.730 mg/kg (wet weight). The minimum concentration (<0.010 mg/kg) was in a composite of 5 channel catfish (*Ictalurus punctatus*) collected from the upper Mississippi River in East Grand Tower, Jackson County. The maximum concentration (0.730 mg/kg) was in a composite of 5 largemouth bass (*Micropterus salmoides*) collected from Cedar Lake near Makanda, Jackson County. It should be noted that there is an active mercury fish advisory for largemouth bass in Cedar Lake.

Fish can have elevated mercury concentrations far from any source of mercury due to aerial deposition from sources such as power plant emissions and emissions from waste to energy plants. For this reason, site-specific mercury concentrations were compared to regional data. Elevated region-wide concentrations of mercury reflect sources that exist outside of the influence of Dead Creek. Weston, USEPA's oversight contractor, does not believe that these region-wide data are appropriate for comparison to the site due to the active fish advisories,

Seventy-one largemouth bass samples are listed in the USEPA's database for Illinois. Most of these are composite samples, however there are seven individual fish samples. The total mercury concentrations in fillets ranged from 0.010 mg/kg (in a composite of 4 fish collected from the Mississippi River in Rock Island County) to 0.730 mg/kg (in a composite of 5 fish from Cedar Lake). In the individual largemouth bass samples, the mercury concentrations ranged from 0.250 mg/kg to 0.460 mg/kg (both ends of the range measured in Chicago).

Therefore, the benchmark concentration of 0.25 mg/kg mercury wet weight is within the range of concentrations detected in fish in the Mississippi River basin in Illinois. The mercury concentrations in Borrow Pit Lake fish that exceed the benchmark concentration may reflect regional conditions and may not necessarily be related to the site.

7.1.2 Measure of effect 1b: COPC concentrations in surface water as compared to applicable water quality criteria for protection of fish and wildlife

Purpose and Rationale. Water concentrations provide a measure of exposure, and water quality criteria indicate levels above which effects may occur. This measure of effect evaluates the potential for water concentrations of COPCs in Dead Creek and the Borrow Pit Lake to cause adverse effects.

Approach: The assessment compares measured concentrations of COPCs in surface water to water quality criteria. Exposure of individual fish and the populations of fish partly depend on the exposure field and the distribution and behavior of the fish. Thus, the area over which water quality criteria are exceeded is an important consideration when evaluating exposure. We evaluate effects with respect to spatial extent and degree to which surface water concentrations exceed water quality criteria.

Evaluation: Tables 7-5 and 7-6 compare surface water concentrations in Creek Section F and the Borrow Pit Lake to Illinois Water Quality Standards, National Recommended Water Quality Criteria (or Ambient Water Quality Criteria (AWQC)), Great Lakes Initiative Tier II values, and other water quality guidelines summarized by Suter and Tsao (1996). For metals, the Illinois standards and AWQC were adjusted for measured water hardness and total metals, as noted in the tables. The analyses were conducted on unfiltered water samples.

Ten metals and dioxin congeners were detected in surface water in Creek Section F. The acute criterion was exceeded for barium in each sample, and the chronic criteria were exceeded in one or two samples for manganese and aluminum.

In the Borrow Pit Lake, 11 metals, ten pesticides, and dioxin congeners were detected in surface water. Acute criteria were exceeded for aluminum and barium in one or two samples. Chronic criteria were exceeded for aluminum, barium, iron, and manganese in each sample.

There were no AWQC or other guidelines available for 2,3,7,8-TCDD based only on toxicity. For three pesticide compounds detected in Borrow Pit Lake surface water (dieldrin, endrin, and heptachlor epoxide), detection limits were greater than standards or criteria in one or two out of three samples.

7.1.3 Measure of effect 1c: Sustainability of benthic macroinvertebrate communities that comprise a prey base

Purpose and Rationale. Benthic macroinvertebrates are an important source of food for many fish species. They experience direct sediment exposures due to their life histories. Exposures that result in reduced abundance, diversity, or biomass of these aquatic macroinvertebrates could indirectly effect fish populations. Further, quantitative studies of benthic macroinvertebrates have a long history of use in water quality studies.

The assessment uses the sediment triad approach as part of a weight-of-evidence analysis to evaluate the sustainability of benthic macroinvertebrate communities in Dead Creek and the Borrow Pit Lake. The sediment triad approach evaluates three elements of a benthic community:

Sediment chemistry measurements;

Field assessment of benthic macroinvertebrates;

Sediment toxicity testing using indicator benthic macroinvertebrates.

7.1.3.1 Sediment Chemical Measurements

Concentrations of COPCs in sediment are compared to sediment benchmarks to evaluate whether adverse biological effects to benthic macroinvertebrates could occur. The sediment guidelines used in this assessment are the consensus-based Threshold Effect Concentrations (TECs) and Probable Effects Concentrations (PECs) developed by MacDonald et al. (2000) and the Ontario (Persaud et al., 1993) Lowest Effect Levels (LEL) and Severe Effects Levels (SEL). Sediment concentrations which exceed these benchmarks do not necessarily indicate that adverse effects to benthic macroinvertebrates have occurred. This risk uses multiple lines of evidence to assess if benthic macroinvertebrates are adversely affected by COPCs.

Tables 7-7 and 7-8 compare sediment concentrations in the Creek Section F and the Borrow Pit Lake to Sediment Quality Guidelines.

In Creek Section F, Probable Effects Concentrations or Severe Effects Levels were exceeded for six metals, cadmium, copper, lead, mercury, nickel, and zinc. Threshold Effects Concentrations were exceeded for these metals and for arsenic, iron, manganese, total PCBs, seven pesticides, and fluoranthene.

In the Borrow Pit Lake, PEC and SEL guidelines were exceeded by manganese and nickel. These metals and arsenic, cadmium, copper, iron, lead, zinc, DDE, total DDT, gamma-BHC, and heptachlor epoxide exceed the TEC and LEL values.

Tables 7-7b and 7-8b compare sediment concentrations in the "industry specific" composite sediment samples from Dead Creek Section F and the Borrow Pit Lake to Sediment Quality Guidelines. The "industry specific" sediment samples were collected from depths of approximately 0 to 12 inches and generally contained higher concentrations than the ecological sediment triad samples collected from depths of 0 to 2 inches. The ecological sediment samples are more representative of current exposures.

In Creek Section F, both PECs/SELs and TEC/LELs were exceeded for copper, zinc, and PCBs in the "industry specific" samples. Copper exceeded PEC/SELs in 15 out of 29 samples and the TEC/LEL in 22 out of 29 samples. Zinc exceeded PEC/SELs in 17 out of 29 samples and the TEC/LEL in 22 out of 29 samples. PCBs exceeded PEC/SELs in 8 out of 29 samples and the TEC/LEL in 17 out of 29 samples.

In Borrow Pit Lake both PECs/SELs and TEC/LELs were exceeded for zinc in the "industry specific" samples. Zinc exceeded the PECs/SELs in one out of eight samples and the TEC/LELs in eight out of eight samples. Copper did not exceed the TEC/LEL in these samples. PCBs were not detected.

In both Borrow Pit Lake and Creek Section F, there is some uncertainty because detection limits for some COPCs were greater than the Sediment Quality Guideline values. These included total PCBs in one sample location in Creek Section F. Other compounds that had detection limits greater than sediment guidelines in one or two out of three sample locations in Creek Section F or Borrow Pit Lake were 4,4,'-DDT, aldrin, dieldrin, endrin, heptachlor, heptachlor epoxide, gamma chlordane, and gamma-BHC (lindane).

7.1.3.2 Field assessment of benthic macroinvertebrate community

Effects are evaluated by comparing the composition and abundance of benthic macroinvertebrates within Dead Creek and the Borrow Pit Lake at different levels of concentrations of COPCs in sediment. Typically, these data would also be compared to data from a reference area that reflects conditions in water bodies unaffected by site COPCs. At the direction of the regulatory agencies, and after the ecological risk assessment was completed, these comparisons were eliminated because agreement was not reached over the appropriateness of the reference areas. However, since data were collected from the reference areas, they are presented here, but no comparison with site data is made.

Several metrics described by Barbour et al. (1999) were employed to discern the status of the benthic macroinvertebrate community in Creek Sector F, the Borrow Pit Lake, and the reference locations (PDC-1, PDC-2, Ref 2-1, and Ref 2-2). These metrics addressed the richness, evenness, and composition of the benthic community as well as the tolerance of each taxon to perturbation.

Samples for benthic community analysis were co-located with sediment sampling locations for chemical analysis and samples for sediment toxicity testing. The results and the data summary table are in Appendix D.

Seven metrics were used to assess the benthic community at each station. The number of organisms, the number of taxa, and the three dominant taxa at each station are presented in Table 7-9. The number of taxa was used as a simple measure of richness. Dominant taxa was used as a simple measure of evenness. Three indices were used to measure diversity in terms of heterogeneity at each station, the Shannon-Weaver Index (H'), relative H', and Simpson's Index (λ). The results of these indices are in Table 7-10. The relative H' index is a comparison of actual diversity to maximum diversity (H'/H'_{max}), where maximum diversity is defined as equal abundance among all taxa. Simpson's Index expresses the probability that two randomly sampled benthic organisms will belong to the same taxa and is a measure of heterogeneity of the benthic community. The composition (Table 7-11) of the benthic community was measured by assessing the relative abundance of six major taxonomic groups (Chironomids, Oligochaetes, Non-chironomid insects, Mollusks, Crustaceans, and Other). A version of Hilsenhoff's Biotic Index of Organic Stream Pollution (Hilsenhoff, 1987), modified to include all benthic macroinvertebrates (Table 7-12), was employed to measure the degree of benthic community impairment based on the tolerance to perturbation of the benthic macroinvertebrates. Data on tolerance were taken from Barbour et al. (1999). Abundance of functional feeding groups (FFG) was also looked at as an additional measure of community impairment and is summarized in Figure 7-1. Data on functional feeding groups were taken from Barbour et al. (1999).

In terms of the number of taxa, dominant taxa, and taxonomic group abundance (Table 7-9), the benthic community from each of the sampling locations resembles the benthic community in deep portions of an eutrophic lake. This community composition reflects the available habitat, as samples were taken from the littoral zones of lentic bodies (Borrow Pit Lake) and the low order stream habitats of Dead Creek Section F. A typical profundal benthic community consists of a low number of taxa dominated by chironomids, oligochaetes and other organisms which are tolerant to low dissolved oxygen concentrations. The benthic community is most likely due to the conditions (e.g., silty substrate, low dissolved oxygen, etc.) in these locations.

Compared to the Borrow Pit Lake, the benthic community in Creek Sector F reflects a more diverse habitat: a closed canopy, relatively heterogeneous substrate, and higher water level. Overall, effects on the benthic community associated with low water levels and high water temperatures are seen in each location. The organically rich sediments of the sampling locations can exacerbate the effects of low water and high temperatures by decreasing already low dissolved oxygen concentrations in the surface water. Concentrations of total organic carbon (TOC) ranged from 12,000 to 84,000 mg/kg dry weight (Appendix A-2). Secondary effects on the benthic community include high homogeneity of substrate (no riffles), silty and very soft sediment, and little to no aquatic macrophytic growth. These are all evident in Dead Creek and the Borrow Pit Lake.

The indices of diversity (H', H'max, and Shannon's) indicate that some locations (i.e., BP-1 and Creek Sector F-1) have a relatively diverse benthic community (Table 7-10). The low number of taxa and the low number of organisms seen in each location, however, overshadow these results (Table 7-11).

According to the modified Hilsenhoff's Biotic Index (Table 7-12), that gives a value to the community structure based on the degree of impairment, the stations in Creek Sector F and the Borrow Pit Lake range from significantly impaired to severely impaired.

Functional Feeding Groups were summarized to assess the community structure (Figure 7-1). Generalists, such as gather/collectors and omnivores, are the dominant functional feeding groups in nearly all stations. This is a reflection of the conditions in the Creek and Borrow Pit Lake, as generalists are considered more tolerant than specialists such as scrapers and shredders. The abundance of predators is proportionately high in stations F-2 and BP-1. Most of the predators in F-2 were ceratopogonids (biting midges; Order diptera). The predators of BP-1 were a diverse group consisting mainly of odonates (dragon and damselflies) and two species of the Order hemiptera.

The only historical information identified for the region is a survey of fourteen streams in the American Bottoms Basin conducted in the spring and summer of 1984 by the IEPA Division of Water Pollution Control (IEPA, 1989). This survey assessed water quality, macroinvertebrates, fish populations, and sediment and fish fillet chemistry. Biological stream characterization and aquatic life use support were also addressed.

Of the fourteen streams surveyed in 1984, six were reported at zero 7-day, 10-year low flow, including Prairie DuPont Creek. An additional six streams were reported at non-zero 7-day, 10-year low flow.

Dead Creek and Borrow Pit Lake are located within the mid-section of the American Bottoms Basin. This part of the basin was considered to be most adversely affected, primarily by industry and urban development in the 1984 study. Within this part of the basin, degradation was greatest in the East St. Louis area. Characterization of streams within the mid-American Bottoms Basin show that low to extremely low dissolved oxygen concentrations and elevated total suspended solids, total dissolved solids, turbidity, total phosphorus, and metals are common. Out of the entire American Bottoms Basin, streams in mid-Basin exhibit the greatest impact on macroinvertebrates and are considered moderate to limited aquatic resources.

The benthic community in Dead Creek Sector F and the Borrow Pit Lake reflect the available habitat. The community is neither diverse nor abundant due to physical conditions (i.e., low water levels, low dissolved oxygen, and silty substrate). This is consistent with observations made by IEPA in 1984.

7.1.3.3 Sediment toxicity testing

The assessment uses laboratory sediment bioassays conducted on sediments from Dead Creek and the Borrow Pit Lake to evaluate the potential effects of whole sediment on representative benthic macroinvertebrates (amphipods and chironomid larvae). The sediment used in the sediment bioassays were collected with the samples for chemical analysis and benthic invertebrate enumeration. Except for VOCs, the chemical sample was subsampled from the sediment collected for toxicity testing. VOC samples were collected directly from the sediment to minimize loss due to volatilization.

The toxicity of the sediment is compared to that of the standard control sediment used by the laboratory as part of the laboratory's standard operating procedures. In samples where the sediment was found to be acutely toxic, chronic toxicity tests were not performed. The laboratory testing reports are in Appendix E.

The amphipod bioassays do not suggest toxicity in Dead Creek Section F and little toxicity in Borrow Pit Lake sediments, while the chironomid bioassays do suggest toxicity in both locations. Toxicity bioassays are complex and can contain a high degree of variability in their results. These data suggest that site sediments may be toxic to some organisms. The agent causing the toxicity is unknown.

Hyalella azteca (Amphipod) Acute Toxicity

Survival of the amphipod in the 10-day acute toxicity bioassay was high at all stations in Creek Sector F and the Borrow Pit Lake, and reference locations, indicating that sediment was not acutely toxic to *H. azteca*. There were no statistically significant differences in survival between samples and laboratory controls. Growth of the amphipod was statistically lower in stations 1 and 3 in the Borrow Pit Lake. The results of the *H. azteca* acute toxicity bioassay are presented in Table 7-13.

H. azteca Chronic Toxicity

The results of the 42-day chronic survival, growth, and reproduction toxicity bioassay are presented in Table 7-14. This is a test that is relatively new and there is less experience with its execution and performance as compared to the acute toxicity tests.

The results of the laboratory controls were unexpectedly low. Therefore, in this situation only, the results of the reference locations were used for comparison instead (PDC-1 and PDC-2 for Creek Sector F; PDC-1, PDC-2, and Ref 2-2 for the Borrow Pit Lake. With the exception of one reference station (Ref 2-1), survival, growth, and reproduction were statistically similar to the reference stations, indicating that sediments were not chronically toxic to *H. azteca*.

Chironomus tentans (Chironomid) Acute Toxicity

Survival of the chironomid larvae in the 10-day acute toxicity bioassay was significantly lower than the laboratory controls in all stations in Creek Sector F, the Borrow Pit Lake, and reference locations. Growth was significantly lower than the laboratory controls in stations F-2, and the reference stations PDC-1, and Ref 2-1. Sediment from Creek Sector-F and stations BP-2, PDC-1, and Ref 2-2 were found to be acutely toxic to *C. tentans* larvae. The results of the *C. tentans* acute toxicity bioassay are presented in Table 7-15.

C. tentans Chronic Toxicity

The results of the 20-day chronic survival, growth, emergence, and reproduction toxicity bioassay are presented in Table 7-16. Survival, emergence, and reproduction in stations BP-1 and BP-3 in the Borrow Pit Lake were significantly lower than laboratory controls. Emergence and reproduction in reference station PDC-2 were significantly lower than laboratory controls.

7.1.3.4 *Sediment Triad Evaluation*

The three elements of the sediment triad are the sediment chemistry measurements, benthic community evaluation, and sediment toxicity tests. This section uses a weight of evidence approach to evaluate sediment toxicity using these three measurements. The evaluation is adapted from information presented in Long and Chapman (1985) and Chapman et al. (1987).

Table 7-17 presents a summary of the results of the Sediment Triad measurements. The shaded areas indicate where a measurement indicates a greater likelihood of effects in Dead Creek Section F or Borrow Pit Lake sediment. For the first measurement, sediment chemistry, many COPCs exceeded TECs or LELs in Dead Creek Section F and Borrow Pit Lake sediment. The number of exceedances on site ranged from 6 to 14. Similarly, Dead Creek Section F and Borrow Pit Lake sediment also exceeded PECs or SELs. The number of exceedances of these values, which represent probable effects, was 0 to 6 on site. There were more exceedances of both TECs/LELs and PECs/SELs in Dead Creek Section F sediment samples than in Borrow Pit Lake sediment samples.

The benthic community measures indicated that organisms in Dead Creek Section F and the Borrow Pit Lake reflect the available habitat. Numbers of organisms and numbers of taxa were generally low. The Shannon-Weaver measure of diversity and Simpsons Index (a measure of heterogeneity) indicated that the site samples demonstrated relatively low diversity The modified Hilsenhoff Index values for the Dead Creek Section F and Borrow Pit Lake indicated impairment of the benthic community. These effects may be attributable to poor habitat conditions of low water levels, silty substrate, and low dissolved oxygen.

The results of the sediment toxicity testing indicated that few effects were measured for amphipods, while acute and chronic effects were measured for chironomid larvae. Effects on growth were measured in the acute toxicity tests on amphipods in two Borrow Pit Lake samples. These two samples had the lowest number of exceedances of TEC/LEL and PEC/SEL values. One of these Borrow Pit Lake samples had no COPCs exceeding Probable Effects Levels. Therefore, there does not appear to be a correlation between the measurement of effects on amphipod growth and sediment chemistry in the two Borrow Pit Lake samples where effects on amphipod growth were measured..

Overall, the evaluation indicated that the benthic community at the site is affected by the available habitat. Toxicity effects measured in Borrow Pit Lake did not correlate with sediment chemistry

7.2 Assessment Endpoint 2; Survival, growth, and reproduction of local populations of aquatic wildlife as represented by the mallard duck, great blue heron, muskrat, and river otter

The assessment uses five measures of effects to evaluate risks to aquatic wildlife. The assessment will use exposure models to evaluate different routes of exposure including ingestion of water, sediment and food (plants, benthic macroinvertebrates and fish). This subsection describes these measures of effects.

7.2.1 *Measure of effect 2a: Wildlife species composition and habitat use*

Purpose and Rationale. This measure of effect directly examines the receptors, wildlife, to estimate if they are using Dead Creek and the Borrow Pit Lake. It provides qualitative information on the degree to which local and migratory wildlife use the habitat.

Approach: The assessment documents the habitat use by wildlife in Dead Creek Section F and Borrow Pit Lake. This type of survey is qualitative. Because of the qualitative nature of the observations and the high natural variability that can exist in wildlife populations, direct observations may not reveal effects.

Evaluation: Menzie-Cura & Associates, Inc. made observations of the site in 1996, and made observations of the site and reference areas during the site reconnaissance survey conducted in September 1999 and during sampling in October and November 1999. The information here is also based on research on ecological receptors at the site.

The Dead Creek channel and adjacent riparian communities form a narrow, linear wetland system that passes through suburban Cahokia. Portions of Dead Creek are adjacent to residential and business lots that contain mowed lawns, buildings, driveways, and roads. To a great extent, these areas have been modified so that only relict portions of natural vegetation alliances exist. Furthermore, many areas are also influenced by non-native plant species. Sections of the creek, however, are used by rare species monitored by the Illinois Endangered Species Protection Board. This illustrates that Dead Creek does possess value for wildlife habitat and as a travel corridor.

The portion of Dead Creek Section F included in this assessment flows through riparian woods and shrubs and into tne Borrow Pit Lake. The Borrow Pit Lake is the largest non-flowing water body in the area. Its shore is surrounded with mature riparian trees. Based on observations of the Borrow Pit Lake at the end of the growing season in September 1999, very little submerged or emergent vegetation appears to grow in the pond. Photographs of these areas in October 1999 are in Appendix B. At that time, water levels were extremely low and sediment was exposed in large portions of the Borrow Pit Lake. Ducks, herons, and fish were observed in the lake. Fish species observed in the pond include: white crappie, largemouth bass, bluegill sunfish, brown bullhead, yellow bullhead, walleye, drum, silver carp, and gar. Table 7-18 lists fish and wildlife species observed at and near the site during the site visit in 1996 and field sampling in 1999.

During high water conditions, Dead Creek flows from the Borrow Pit Lake into the ditched section of Prairie du Pont Creek. At the confluence of Dead Creek and Prairie du Pont Creek and above it, the ditch shore is vegetated with grasses, herbs, and small shrubs. The flow in the ditch is northwest to Arsenal Island on the Mississippi River. Arsenal Island contains areas of mature riparian woods and agricultural fields. The shoreline of the lower end of the ditch (referred to on the USGS map as Cahokia Chute) is lined with riparian woods, principally large cottonwoods and willow. Large catfish, wood duck, wading birds, and turtles were observed in the channel. Cahokia Chute forms the eastern border of Arsenal Island. The waterway flows north to south, draining the region northeast of the island. It appears that during times when the Mississippi River is high, the river uses the chute channel to flow around Arsenal Island. Any water from the Dead Creek watershed therefore only flows through the lower half of the Cahokia Chute between the confluence with the ditched Prairie du Pont and the Mississippi River. The remains of a bald eagle nest and congregating wading birds were observed in 1996 at the southern tip of Arsenal Island, where the Chute flows into the Mississippi.

Nine vegetation alliances were identified in the vicinity of Dead Creek based on vegetation, landscape position, and hydrological characteristics. These are: White Ash (*Fraxinus americana)* – American elm (*Ulmus americana*) Temporarily Flooded Forest, Eastern Cottonwood (*Populus deltoides*) Temporarily Flooded Forest, Black Willow (*Salix nigra)* Temporarily Flooded Forest, Buttonbush (*Cephalanthus occidentalis)* Semi-permanently Flooded Shrubland, *Persicaria*–Mixed Forb Temporarily Flooded Herbaceous, *Typha* Seasonally Flooded Herbaceous, *Potamogeton–Ceratophyllum–Elodea* Permanently Flooded Herbaceous, Temporary Open Water, and Permanent Open Water. The location and extent of each community is shown on Figure 7-2.

Extensive wetlands occur west of Route 3, particularly in the vicinity of the Borrow Pit Lake. The Creek's wetlands appeared healthy with no evidence of ecological stress (no chlorotic plants, no monospecific stands of vegetation, no areas of dying or dead vegetation, no observed surface water sheens or sediment staining) with the exception of extremely low water levels observed in the Fall of 1999 when portions of Dead Creek and the Borrow Pit Lake dried out completely. The wetlands also appeared to support a diverse aquatic and terrestrial wildlife community, with abundant prey species (i.e., fish, frogs, turtles) and predatory species (i.e., wading birds, waterfowl, raccoons). The wetlands west of Route 3 receive water from both Dead Creek and from drainage areas to the north.

Animal use of the Dead Creek study area is generally limited to species that do not require large tracts of pristine land and can tolerate some level of habitat modification and disturbance. These animals are mostly species that can use residential areas for foraging and/or shelter or are smaller vertebrates that have limited space requirements. The juxtaposition of forest, shrubland, and open water does provide for some landscape diversity. Additionally, the proximity of the site to the Mississippi River and presence of wetlands provide feeding areas for migratory waterfowl and wading birds. The early age of most of the communities (due to disturbance), however, provided limited structural diversity.

Several species of birds were observed using Dead Creek and the adjacent riparian corridor for foraging and roosting. Many of the birds seen were those that frequent residential areas (e.g., American robin, northern cardinal, blue jay, northern mockingbird) and could use the area of the Dead Creek floodplain for nesting. Carolina wrens, several species of sparrows, and Eurasian tree sparrows were noted using dense shrub and liana thickets. European starlings were seen roosting in large flocks in the larger trees along Dead Creek. Limited use of the open water sections by waterfowl and wading birds does occur. These open water areas of Dead Creek are likely also used during the breeding season for feeding by swallows, phoebes, and flycatchers. On two occasions, a great horned owl was seen in or near the study area. Bird species known or likely to occur in the Dead Creek study area are presented in Table 7-18.

Mammals using Dead Creek habitats were primarily rodents, small omnivores, and likely bats and insectivores (i.e., shrews). Eastern chipmunks and gray squirrels were seen frequently during the surveys. Raccoon tracks were found nearly everywhere the ground surface was conducive to track formation. The only large mammal documented in the study area was white-tailed deer. Numerous tracks were observed of this species. Mammal species known or likely to occur in the Dead Creek study area are presented in Table 7-18.

Few amphibian and reptiles (collectively called herpetiles) were observed in the vicinity of Dead Creek. However, the stream channel and adjacent riparian forest provide habitat for a number of species that can occur in small, somewhat disturbed, water bodies. Animals that are ubiquitous in many wetland types in the United States, such as bullfrogs, northern cricket frogs, painted turtles, red-eared sliders, and common garter snakes, are expected to use Dead Creek for feeding and shelter. Herpetile species known or likely to occur in the Dead Creek study area are presented in Table 7-18.

Though Illinois has a rich fish fauna, it was expected that few species would be found in Dead Creek. Due to blocked drainages and elevated culverts, much of the upper Dead Creek functions more as a series of linear, shallow ponds rather than a flowing stream course. Therefore, during much of the year, it would be difficult for fish to move through the watershed to escape declining water levels or other stressful conditions (e.g., high water temperature, low dissolved oxygen, avian predators). Furthermore, Dead Creek generally possessed turbid water and had a soft bottom, eliminating species that require clear water and firm substrate. No fish were observed in Dead Creek Section F. However, a large variety of fish species were present in Borrow Pit Lake. Fish observed in Dead Creek and Borrow Pit Lake are in Table 7-18.

Habitat Known to be Used by Federal Designated or Proposed Endangered or Threatened Species

According to the records of the Illinois Department of Natural Resources' Natural Heritage Inventory, the only federally endangered or threatened species in the study area is the federally threatened bald eagle (*Haliaeetus leucocephalus*). In 1993, a pair of eagles unsuccessfully attempted to nest at the southern tip of Arsenal Island, where the ditched portion of Prairie du

Pont Creek enters the Mississippi River. The pair apparently was scared off the site based on the unsuccessful nesting attempt. The next year the pair returned to the island, but no monitoring was conducted to determine if they successfully nested. The nest has since blown down and no other nests have been constructed on the island.

Portions of the area suitable for eagle foraging include waterbodies large enough to support large fish such as carp and catfish. The Mississippi River, the channelized section of Prairie du Pont Creek, and the Borrow Pit Lake appear to support large fish and provide enough open water for eagles to fish. Two bald eagles were observed by USEPA and Illinois EPA representatives approximately 1 mile west of Dead Creek Section B and 0.5 miles east of the Mississippi River in late 1999. A bald eagle was also observed in the same location in December 2000.

The US Fish and Wildlife Service Region 3 (USFWS, 2001) also lists the Indiana bat (*Myotis sodalis*), and the Illinois cave amphipod (*Gammarus acherondytes*) as federally-listed endangered species and the plant Decurrent false aster (*Boltonia decurrens*) as a federally-listed threatened species potentially present in the vicinity of the site (St. Clair, Illinois). The Indiana bat requires a habitat of small stream corridors with well developed riparian woods and nearby upland forest. The wooded areas around Dead Creek and the Borrow Pit Lake are not well developed due to nearby residential and agricultural uses, and therefore, do not provide good habitat for the Indiana bat. The Illinois cave amphipod is listed for St. Clair county, but exists in cave streams in Illinois sinkhole plains, a habitat not present on the site. The Decurrent false aster is present in disturbed alluvial soils in the Mississippi River floodplain, and could be present at the site, although none was observed there.

Habitat Known to be Used by State Designated Endangered or Threatened Species

The Illinois Natural Heritage Inventory did not have any records of state-listed endangered or threatened species in the study area. However a number of state-listed wading birds were observed throughout the wetlands and waterways. Illinois endangered species observed were little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), and black-crowned night heron (*Nycticorax nycticorax*). Great egret (*Casmerodius albus*), an Illinois threatened species, was also observed. Small numbers (one to ten individuals) of these wading birds were found foraging along sections of Dead Creek, the ditched length of Prairie du Pont Creek, Cahokia Chute, and the Mississippi River. The largest concentrations of foraging herons (approximately ten individuals at a location) were observed at the confluence of Dead Creek and the ditched Prairie du Pont Creek, and where the ditched Prairie du Pont flows into the Mississippi. These areas likely support the best concentrated fishing areas for wildlife along the waterways.

No wading bird colonies were located within the study area. However, the Illinois Natural Heritage Inventory has documented two 1000-2000 nest mixed-species colonies in East St. Louis. The closest of these two colonies is approximately one mile east of Sauget Area I near the Alton & Southern rail yards in Alorton. The second site is over two miles to the north at Audubon Avenue and 26th Street. These two colonies contain the only breeding little blue heron and snowy egret in Illinois. In addition, black-crowned night heron, great egret, cattle egret (*Bubulcus ibis*), great blue heron (*Ardea herodias*), and green-backed heron (*Butorides virescens*) nest in the colonies.

In 1988, because the region is heavily industrialized with numerous Superfund sites, the U.S. Fish & Wildlife Service (USFWS) collected black-crowned night heron and little blue heron eggs from the Alorton colony for contaminant analysis (Young, 1989 - unpublished draft). Sediment samples were also taken in areas of observed wading bird foraging around the East St. Louis region. No testing was done of sediments in the Dead Creek drainage. Polychlorinated biphenyls (PCBs), DDE, and metals were detected at varying levels in the wading bird eggs.

The observed endangered and threatened wading birds forage on a wide range of aquatic organisms, such as fish, frogs, and crayfish, as well as some terrestrial species such as reptiles and insects. The USFWS study found that wading birds forage over a wide area around East St. Louis. The Dead Creek/Prairie du Pont wetlands system composes a relatively small percentage of the available wetland foraging area in the region.

Also observed in the vicinity of Dead Creek were a Illinois-listed threatened bird species, the brown creeper (*Serthia americana*) and a rare grass species, early wild-rye (*Elymus macregorii*).

The brown creeper is a small, brown-streaked bird related to nuthatches that occurs throughout most of the United States and southern Canada. As its name implies, it forages by moving closely over the stem and main branches of trees. Its diet is comprised largely of insects, though some seeds and nuts are eaten as well (Ehrlich *et al.*, 1988). This bird commonly nests in conifer, mixed conifer-hardwood, or hydric forests. Special habitat requirements include standing dead trees with loose bark for feeding and trees greater than 25 cm in diameter for nesting (Thomas *et al.*, 1979). This species was heard singing in November 2000 from Dead Creek Section B. The general Dead Creek area possesses a few, very large diameter, standing dead trees. It is likely that brown creeper use of the Dead Creek area is minor due to limited intact forest and the young age of most trees.

Early wild-rye is a recently described species belongs to a group of taxonomically challenging grasses. Early wild-rye possesses a single spike of congested flowers tipped by long bristles. It occurs primarily in rich forests and floodplains in eastern United States and has been documented from five counties in Illinois (e.g., Fulton, Jersey, Knox, Peoria, Union) based on review of museum specimens performed by Campbell (in ed.). Because this species occurs in floodplain forests, a community that has largely been converted to agricultural land in Illinois, this species may be extirpated from portions of the state. Though this species is not formally listed by the Illinois Endangered Species Protection Board, early wild-rye appears to be rare in the state and information on its occurrence is being supplied in the event it becomes a state-tracked species. The only occurrence of this grass in the Dead Creek study area was from a White Ash – American Elm Temporarily Flooded Forest on the east bank of Dead Creek Section C. The plants were limited to a small area (2 m^2) and were senescent with dispersing fruits at the time of observation. Poison ivy, trumpet-creeper, white snakeroot, rough-leaved dogwood, and black raspberry were associated species.

Reference Areas: Reference area 1 was a section of Old Prairie du Pont Creek near the town of East Carondelet, approximately 3 miles southwest of the end of Dead Creek in the Borrow Pit Lake. This section of Old Prairie du Pont Creek is a broad shallow water body with a mud substrate similar to the Borrow Pit Lake. It is distant from any influence from the site or other industrial areas, but is similar to the Borrow Pit Lake in that it is near agricultural land. It is also similar to the Borrow Pit Lake in that it has a narrow riparian zone but little to no emergent or submerged vegetation. Great and/or snowy egret were observed in this area. It supports a similar fish community to the Borrow Pit Lake. Many of the same species of fish (brown bullhead, crappie, bluegill sunfish, largemouth bass) and invertebrates (clams and shrimp) were present in this reference area.

Two bodies of water in Monroe County comprise reference area 2 and were selected during the main sampling event. These water bodies were approximately 20 miles south of Dead Creek. Reference area 2-1 was in Long Slash Creek north of the culvert where Merrimac Road crosses the creek. This section was similar to Dead Creek sectors B through E in that it was shallow and muddy. It was also similar to these areas (but not Creek Section F) in that it had a road crossing and agricultural fields coming down to the water's edge. There was evidence of beaver activity at the culvert under the road crossing. Biota present in this area included creeping buttercup and snails. Reference area 2-2 was a flooded borrow pit north of Fountain Creek. Reference area 2-2 had a muddy substrate and similar fish community to the Borrow Pit Lake. Surrounding vegetation consists of a thin riparian zone similar to Reference Area 1. The same fish and invertebrate species were found at this reference area as well.

Conclusions: During the various field surveys and contact with state and federal agencies, three categories of sensitive environments were identified in the Dead Creek area: Habitat Known to be Used by Federal Designated or Proposed Endangered or Threatened Species, Habitat Known to be Used by State Designated Endangered or Threatened Species, and Wetlands. The state-listed endangered and threatened species observed on site (herons and egrets) forage over a wide area, with the Dead Creek watershed forming only a small part of their available feeding territory. The brown creeper makes only minor use of the Dead Creek area because the habitat is not suitable (not enough mature trees).

The Dead Creek watershed also appears to support a diverse plant and animal community. While much of the creek flows through residential neighborhoods, sufficient natural riparian vegetation remains to support local aquatic and terrestrial communities. The ecological stresses observed (lack of emergent or submerged vegetation, impaired benthic invertebrate community) are due to poor habitat conditions including low water levels, silty substrate, and low dissolved oxygen concentrations. No other evidence of ecological stress was evident in Dead Creek or the Borrow Pit Lake. Birds and wildlife species are abundant and making use of the habitat.

7.2.2 Measure of effect 2b: Concentrations of COPCs in aquatic and marsh plants

Purpose and Rationale. The assessment discusses concentrations of COPCs in creeping buttercup in Dead Creek Section F. No submerged or emergent aquatic vegetation was present in the Borrow Pit Lake. Therefore, during the site reconnaissance, creeping buttercup was selected as a plant species that could be grazed upon by waterfowl and herbivorous mammals and that was present in most sections of Dead Creek. This species of plant has a fleshy stem, but a tiny root system. Therefore, the entire plant was analyzed for COPCs. If plants take up metals and PAHs from the water or sediments, waterfowl and herbivorous mammals could be exposed to these COPCs in their diet.

Approach: The endpoint is evaluated in multi-pathway exposure models for the mallard and the muskrat that consider concentrations of COPCs in sediment, water, and food. Exposures of waterfowl and herbivorous mammals within Dead Creek Section F are compared to appropriate NOAEL and LOAEL values. The COPC concentrations measured in creeping buttercup will be used to evaluate potential dietary exposures of the mallard and muskrat.

Evaluation: Table 7-19 presents maximum and average concentrations of COPCs detected in creeping buttercup samples from Dead Creek Section F. Compounds detected in plants from Dead Creek Section F include the metals aluminum, antimony, arsenic, cadmium, copper, lead, nickel, and zinc, the PAHs acenaphthylene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene, benzo(g,h,i)perelene, indeno(1,2,3-c,d)pyrene, and dibenz(a,h)anthracene, the herbicide dicholoroprop, the pesticides aldrin, gamma chlordane, heptaclor, and dioxins. This indicates that herbivorous wildlife receptors could be exposed to some site COPCs via the food chain.

Concentrations of COPCs detected in plants from Dead Creek Section F were used in food chain models to evaluate potential risks to mallards and muskrat, as representative species of herbivorous wildlife. The details of the food chain model are discussed in Appendix E. Results are summarized in Table 7-20a. The food chain models were run separately with average and maximum sediment concentrations from the ecological sediment samples and with the average and maximum sediment concentrations from the combined ecological sediment samples and "industry specific" samples.

Food Chain Model Results – ecological sediment samples (0 to 2 inch depth)

Muskrat

Using data from the ecological sediment samples, food chain modeling indicated that the average doses of COPCs that muskrats receive from ingesting plants, sediment, and surface water from Dead Creek Section F do not exceed NOAEL or LOAEL concentrations, with the exception of aluminum. The hazard indices for aluminum were 50 and 5 compared to the NOAEL and LOAEL using average concentrations and 70 and 7 using maximum concentrations. Surface water concentrations of aluminum did not contribute appreciably to these hazard indices. Two thirds of the calculated aluminum dose are from sediment and one third is from food (plants). The sediment aluminum concentrations in Dead Creek Section F (7,800 to 17,000 mg/kg) are within the range of Illinois background soil (up to 37,200 mg/kg; IEPA, 1994). Because a muskrat's foraging area is smaller than Creek Section F, the model assumed that a muskrat eats vegetation from Dead Creek Section F year round. This indicates that under current conditions represented by the ecological sediment samples, the site-related exposures of herbivorous mammals are indistinguishable from Illinois background.

Mallard

Using data from the ecological sediment samples, food chain modeling for mallards ingesting plants from Dead Creek Section F year round resulted in hazard indices less than 1 compared to NOAEL doses for each COPC using average concentrations and a foraging area of 580 hectares (USEPA, 1993; vs. 0.3 hectares in Dead Creek Section F). Hazard indices were also less than one compared to NOAEL doses using maximum concentrations and assuming the mallard feeds only in Dead Creek Section F. This indicates that waterfowl that ingest plants from Dead Creek Section F under current conditions represented by the ecological sediment samples are not at risk from COPCs.

Food Chain Model Results – combined ecological and "Industry Specific" sediment samples

Muskrat

Using the average or maximum data from the combined ecological and "industry specific" sediment samples, average doses of copper, zinc, and PCBs that muskrats receive from ingesting plants, sediment, and surface water from Dead Creek Section F do not exceed NOAEL or LOAEL concentrations. The exposure concentrations for the remaining COPCs were the same as described above for the ecological sediment samples (hazard indices for aluminum greater than 1 based on background aluminum concentrations in sediment).

Mallard

When the data from the combined ecological and "industry specific" sediment samples are used in the food chain model for mallards that ingest plants in Dead Creek Section F, hazard indices for copper, zinc, and PCBs do not exceed one. However, when maximum sediment concentrations are used from these samples, hazard indices exceed one for zinc for the NOAEL but not the LOAEL dose. This indicates that under the most conservative assumptions, zinc in deeper Dead Creek Section F sediments could pose a potential risk to mallards. The deeper sediments do not represent current exposure conditions, and would only pose this potential risk if exposed by a scour event. The exposure concentrations for the remaining COPCs were the same as described above for the ecological sediment samples (hazard indices less than 1).

7.2.3 Measure of effect 2c: Concentration of COPCs in surface waters

Purpose and Rationale. Many wildlife species will use Dead Creek and associated wetlands as a drinking water source. The presence of COPCs in water could be a source of exposure to these species. This measure of effect examines this potential route of exposure.

Approach: This endpoint is evaluated by two methods. Concentrations of COPCs in surface water are compared to drinking water values for wildlife developed by Sample et al. (1996). In addition, surface water concentrations are used in multi-pathway exposure models for wildlife that develop exposure doses based on concentrations in sediment, water, and food.

Evaluation: Surface water concentrations of COPCs in Dead Creek were compared to drinking water no observed adverse effects levels (NOAEL) and lowest observed adverse effects levels (LOAEL) developed by Sample et al. (1996). Tables 7-21 and 7-22 summarize these comparisons for Dead Creek Section F and the Borrow Pit Lake. For each compound, the lowest NOAEL values for water were used as benchmarks. In Creek Section F and the Borrow Pit Lake, surface water concentrations do not exceed any of the wildlife benchmarks. Note that there is no benchmark available for some constituents.

The results of food chain modeling are in Appendix E. In each of the food chain models, average and maximum surface water concentrations from Dead Creek Section F and the Borrow Pit Lake did not result in a potential risk to wildlife. Surface water concentrations contributed a minor portion to the hazard indices for each COPC.

7.2.4 *Measure of effect 2d: Concentration of COPCs in fish*

Purpose and Rationale: Some wildlife species such as the great blue heron and river otter eat primarily fish. This measure of effect evaluates this potential route of exposure.

Approach: The COPC levels measured in fish are used in the multi-pathway exposure model for the great blue heron and river otter that incorporate concentrations in sediment, water, and food. Exposures of the great blue heron and river otter within Dead Creek and the Borrow Pit Lake are compared to appropriate NOAEL and LOAEL values. Because plants were the only biota collected in Dead Creek Section F (few minnows were present in this section of Dead Creek and were not abundant enough to collect), concentrations of COPCs in fish were modeled for this area using site-specific bioaccumulation factors (BAFs). The details of how these BAFs were calculated are presented in Appendix G.

7.2.4.1 *Evaluation of Measured Fish Concentrations*

Evaluation: Tables 7-1, 7-2, and 7-3 present maximum and average concentrations of COPCs detected in largemouth bass, brown bullhead, and forage fish, respectively, from the Borrow Pit Lake.

Concentrations of COPCs detected in fish the Borrow Pit Lake were used in food chain models to evaluate potential risks to great blue herons and river otter, as representative species of piscivorous wildlife. The details of the food chain model are discussed in Appendix E. Results are summarized in Table 7-20b.

Food Chain Model Results – ecological sediment samples (0 to 2 inch depth)

River Otter

For the river otter eating a diet of large and small fish (72% "large fish" such as largemouth bass or brown bullhead and 28% forage fish, based on information in USEPA (1993)) from the Borrow Pit Lake, average concentrations of COPCs in fish tissue, ecological sediment samples, and surface water resulted in hazard indices less than 1 compared to the NOAEL dose. This model used average concentrations of COPCs to represent an otter integrating exposure from different species of fish consumed and different locations within the Borrow Pit Lake. It also assumes that the Borrow Pit Lake comprises approximately 0.01 of a river otter's foraging area (5 hectares of the Borrow Pit Lake/400 hectare foraging area (USEPA, 1993). When maximum concentrations were used and the river otter was assumed to forage only in the Borrow Pit Lake, hazard indices exceeded 1 for aluminum and mercury. Two thirds of the river otter's aluminum dose comes from sediment, and aluminum concentrations in Borrow Pit Lake sediment are within Illinois background for soil (4,000 to 16,000 mg/kg in the Borrow Pit vs. up to 37,200 mg/kg in Illinois background soil; IEPA, 1994). Mercury concentrations in sediment were similar in the Borrow Pit Lake are also within background (0.10 to 0.16 mg/kg at the Borrow Pit compared to up to 0.99 mg/kg in Illinois background soil (IEPA, 1994). This conservative maximum assessment places an upper bound on potential risk, but does not imply risk to piscivorous mammals at the Borrow Pit Lake.

Food Chain Model Results – combined ecological and "industry specific" sediment samples

River Otter

Using average and maximum concentrations of copper, zinc, and PCBs from the "industry specific" sediment samples did not result in hazard indices greater than one for the river otter ingesting fish, sediment, and surface water. Exposure point concentrations for the remaining COPCs were the same as discussed above for the ecological sediment samples (hazard indices above 1 for aluminum and mercury only for the most conservative case restricting the river otter's foraging area to the Borrow Pit Lake).

Food Chain Model Results – great blue heron

For the great blue heron, the food chain model using average concentrations of COPCs in small (73% forage fish) and large fish (27% "large" fish such as largemouth bass and brown bullhead based on information in USEPA (1993)) and surface water, the hazard index for mercury compared to the NOAEL dose was 4. The hazard index compared to the LOAEL dose was 0.4. The hazard indices for the rest of the COPCs were less than 1 compared to the NOAEL dose. This model also assumed that great blue heron were foraging onsite from early March to late November (Illinois, 2000) and that a heron's foraging area is approximately the size of the Borrow Pit Lake (a foraging area of 0.6 to 8.4 hectares as reported in USEPA (1993) compared to 4.9 hectares of the Borrow Pit Lake). When a larger foraging area was used (3-mile radius that is likely to be more representative of herons known to nest in the area (East St. Louis and Alorton, Illinois), hazard indices compared to the NOAEL dose were less than 1. When maximum concentrations were used in the model and the herons were assumed to forage on site year round, only mercury had a hazard index greater than one compared to the NOAEL dose, but not the LOAEL dose. These hazard indices greater than one for mercury are due to concentrations in brown bullhead and small minnows. This indicates some potential risk to piscivorous birds due to mercury in fish tissue at the Borrow Pit Lake. The potential risk may be indistinguishable from regional conditions, as concentrations of mercury in Borrow Pit Lake fish were within the range of concentrations detected in Illinois fish.

7.2.4.2 Evaluation of Modeled Fish Concentrations in Dead Creek Section F

Modeled average concentrations of COPCs in fish in Dead Creek Section F were used in food chain models to evaluate potential risks to great blue herons and river otter, as representative species of piscivorous wildlife. The methods used to model the fish concentrations are presented in Appendix G. The details of the food chain model are discussed in Appendix F. Results are summarized in Table 7-20a.

Food Chain Results – river otter

For the river otter eating a diet of fish (modeled based on forage fish concentrations) and also ingesting surface water and sediment, hazard indices are less than one compared to NOAEL doses. Therefore, river otter consuming fish from Dead Creek Section F would not be at risk.

Food Chain Model Results – great blue heron

For the great blue heron, the food chain model using average modeled concentrations of COPCs in fish and measured surface water concentrations, the hazard index for mercury is one and the hazard indices for the remaining COPCs are less than one compared to NOAEL doses. This indicates that great blue heron would not be at risk from consuming fish in this area.

7.2.5 Measure of effect 2e: Concentration of COPCs in benthic macroinvertebrates

Purpose and Rationale. Waterfowl (such as the mallard) and mammals (such as the muskrat and river otter) eat benthic macroinvertebrates as a portion of their diet. This measure of effect evaluates this potential route of exposure.

Approach: The COPC levels measured in benthic macroinvertebrates are used in a multi-pathway exposure model for the mallard, muskrat, and river otter that incorporates concentrations in sediment, water, and food. Exposures of waterfowl and mammals within Dead Creek and the Borrow Pit Lake are compared to appropriate NOAEL and LOAEL values. Because plants were the only biota detected in Dead Creek Section F, concentrations of COPCs in macroinvertebrates were modeled for this area using site-specific bioaccumulation factors (BAFs). The details of how these BAFs were calculated are presented in Appendix G. In addition, a combination of literature values and site specific BAFs were used to model concentrations of COPCs in aquatic insects (Appendix G). These modeled concentrations were used to evaluate potential risk to three swallows.

7.2.5.1 Evaluation of Measured Macroinvertebrate Concentrations

Evaluation: Tables 7-22 and 7-23 present maximum and average concentrations of COPCs detected in shrimp and clams, respectively, from the Borrow Pit Lake. Only one composite shrimp sample was collected from the Borrow Pit Lake. Pentachlorophenol, aluminum, antimony, chromium, copper, lead, silver, zinc, diethyl phthalate, and dioxins were detected in this sample. The clam samples from Borrow Pit Lake contained dichloroprop, MCPP, aluminum, arsenic, cadmium, chromium, copper, lead, silver, zinc, heptachlor, methorychlor, two phthalates, and dioxin.

Concentrations of COPCs detected in shrimp from the Borrow Pit Lake were used in food chain models to evaluate potential risks to mallards; concentrations detected in clams were used to evaluate potential risks to muskrat and river otter. The details of the food chain model are discussed in Appendix E. Results are summarized in Table 7-20b.

Food Chain Model Results – ecological sediment samples (0 to 2 inch depth)

Muskrats feeding on clams

Food chain modeling indicated that the average doses of COPCs that muskrats receive from ingesting clams, sediment from ecological sediment samples (0 to 2 inches), and surface water from the Borrow Pit Lake do not exceed NOAEL or LOAEL concentrations, with the exception of aluminum. Approximately 80% of the muskrat's aluminum dose is from sediment, and the sediment concentration in the Borrow Pit Lake is within Illinois background for soil. The hazard indices for aluminum were 40 and 4 compared to the NOAEL and LOAEL using average concentrations and 50 and 5 using maximum concentrations. Surface water concentrations of aluminum did not contribute appreciably to these hazard indices.

River otter feeding on clams

For the river otter eating clams from the Borrow Pit Lake, average concentrations of COPCs in clam tissue, surface sediment (represented by the ecological sediment samples), and surface water resulted in hazard indices less than 1 compared to a NOAEL dose. This model used average concentrations of COPCs to represent an otter integrating exposure different locations within the Borrow Pit Lake. It also assumes that the Borrow Pit Lake comprises approximately 0.01 of a river otter's foraging area. When maximum concentrations were used and the river otter was assumed to forage only in the Borrow Pit Lake, the hazard index exceeded 1 for aluminum. Approximately 80% of the river otter's dose of aluminum is due to sediment, and the sediment concentrations of aluminum in Borrow Pit Lake is within the range of background for Illinois soil.

Mallards feeding on shrimp

Food chain modeling for mallards that eat shrimp from Dead Creek Section F resulted in hazard indices less than 1 compared to the NOAEL dose for each COPC using both average and maximum concentrations for shrimp, surface water, and surface (ecological) sediment samples.

Food Chain Model Results – combined ecological and "industry specific sediment samples

Muskrats feeding on clams

For muskrats feeding on clams, when average and maximum concentrations from the combined ecological and "industry specific" sediment samples from Borrow Pit Lake are used, hazard indices for copper, zinc, and PCBs do not exceed one compared to a NOAEL dose. Exposure point concentrations for the remaining COPCs are the same as for the ecological sediment samples discussed above. Only aluminum has a hazard index above 1 due mostly to sediment concentrations within the background range for Illinois soil.

River otter feeding on clams

For river otter feeding on clams, when average and maximum concentrations from combined ecological and "industry specific" sediment samples from Borrow Pit Lake are used, hazard indices for copper, zinc, and PCBs do not exceed one compared to a NOAEL dose. Exposure point concentrations and hazard indices for the remaining COPCs are the same as for the ecological sediment samples described above (only aluminum has a hazard index above 1 for the most conservative case restricting the river otter's foraging to the Borrow Pit Lake).

Mallards feeding on shrimp

Food chain modeling for mallards that eat shrimp from Dead Creek Section F resulted in hazard indices less than 1 compared to the NOAEL doses for each COPC using both average and maximum for shrimp, surface water, and combined ecological and "industry specific" sediment samples.

The results of the food chain modeling indicate that wildlife that consume macroinvertebrates (clams and shrimp) from the Borrow Pit Lake are not at risk. The exposure of some wildlife to aluminum above a NOAEL or LOAEL dose is represents background conditions.

7.2.5.2 Evaluation of Modeled Macroinvertebrate Concentrations in Dead Creek Section F and the Borrow Pit

Modeled average concentrations of COPCs in snails in Dead Creek Section F were used in food chain models to evaluate potential risks to mallards and muskrat. Modeled average concentrations of COPCs in aquatic insects in Dead Creek Section F and the Borrow Pit Lake were used in a food chain model to evaluate potential risks to tree swallows. The methods used to model the snail and insect concentrations are presented in Appendix G. The details of the food chain model are discussed in Appendix F. Results are summarized in Tables 7-20a and 7-20b.

Mallard feeding on snails in Creek Section F

For the mallard ingesting snails, surface water and sediment, hazard indices are less than one compared to NOAEL doses. Therefore, mallards consuming snails from Dead Creek Section F would not be at risk.

Muskrat feeding on snails in Creek Section F

For the muskrat in Dead Creek Section F, the food chain model using average modeled concentrations of COPCs in macroinvertebrates and measured surface water and sediment concentrations, hazard indices exceed one for aluminum, antimony, copper, and dioxins. The modeled doses exceed the NOAEL dose but not the LOAEL dose for antimony and dioxin. The modeled doses exceed the LOAEL dose for aluminum and copper. This indicates a potential risk for muskrats foraging for macroinvertebrates in Dead Creek Section F.

Tree swallow feeding on aquatic insects in Creek Section F

For a tree swallow that feeds on aquatic insects (concentrations modeled from ecological sediment samples and from combined ecological and "industry specific" sediment samples) in Creek Section F, hazard indices exceed one for aluminum, cadmium, chromium, mercury, zinc, Total PCBs, Total DDT, and dioxin compared to a NOAEL dose. Hazard indices exceed 1 for mercury and Total PCBs compared to a LOAEL dose.

Tree swallow feeding on aquatic insects in the Borrow Pit Lake

The modeling results for a tree swallow the feeds on aquatic insects in the Borrow Pit Lake indicate that hazard indices are greater than one for aluminum, chromium, mercury, zinc, Total DDT, and dioxin when insect concentrations are modeled from the concentrations in the ecological sediment samples (0 to 2 inch depth). These hazard indices indicate that exposure exceeds the NOAEL, but not the LOAEL dose. When the insect concentrations are modeled from the concentrations from the combined ecological and "industry specific" sediment samples, hazard indices exceed one compared to the NOAEL dose, but not the LOAEL dose for aluminum, chromium, mercury, zinc, Total PCBs, Total DDT, and dioxin. The hazard index for PCBs also exceeds the LOAEL dose.

7.3 Assessment Endpoint 3: Survival, growth, and reproduction of individuals within the local bald eagle population that may overwinter near the site

The assessment uses an exposure model to evaluate different routes of exposure including ingestion of water, sediment and fish.

7.3.1 *Measure of effect 3a: Concentration of COPCs in fish for use in evaluating exposure via the food chain*

Purpose and Rationale. Bald eagle may use fish in Dead Creek and associated wetlands as food. The presence of COPCs in fish could be a source of exposure to this species. This measure of effect examines this potential route of exposure.

Approach: This endpoint is evaluated via an exposure model for the bald eagle. The assessment compare exposures to) appropriate NOAEL and LOAEL values.

Evaluation: Tables 7-2 and 7-3 present maximum and average concentrations of COPCs detected in largemouth bass and brown bullhead, respectively, from the Borrow Pit Lake.

As stated in Section 7.2.4, some COPCs were detected in largemouth bass and brown bullhead samples from the Borrow Pit Lake.

Concentrations of COPCs detected in fish from the Borrow Pit Lake were used in food chain models to evaluate potential risks to the bald eagle. The details of the food chain model are discussed in Appendix F. Results are summarized in Table 7-20b.

Food Chain Model Results – measured fish concentrations in Borrow Pit Lake

The food chain model for the bald eagle using average concentrations in large fish and surface water did not result in hazard indices for any COPC greater than 1 compared to the NOAEL dose. This model assumed that eagles overwinter in the vicinity of the site from October through March and that the Borrow Pit Lake comprises about 0.003 of the eagles foraging area (5 hectares vs. 1880 hectares foraging area; USEPA, 1993). Using maximum concentrations in large fish and surface water and assuming that the eagle forages year round and only at the Borrow Pit Lake resulted in a hazard index for mercury of 5 compared to the NOAEL dose. However, even for this conservative case, the estimated exposure dose is still less than the LOAEL value. The maximum mercury concentration in largemouth bass and brown bullhead combined was measured in one composite brown bullhead sample that was approximately 5 times higher than mercury concentrations from other large fish from the Borrow Pit Lake.

Food Chain Model Results – modeled fish concentrations in Creek Section F

An additional evaluation was conducted using modeled average concentrations of COPCs in fish in Dead Creek Section F to evaluate potential risks to bald eagles. The methods used to model the fish concentrations are presented in Appendix G. The details of the food chain model are discussed in Appendix F. Results are summarized in Table 7-20a.

The results predict that hazard indices for the eagle eating fish from Dead Creek Section F are less than one for the NOAEL dose. Therefore, bald eagles consuming fish from Dead Creek Section F would not be at risk.

7.4 Assessment Endpoint 4: Survival, growth, and reproduction of local populations of terrestrial wildlife along the banks and floodplain of Dead Creek

7.4.1 Measure of effect 4a: COPC concentrations in soil samples from the creek bank and floodplain as compared to applicable soil screening levels for protection of wildlife, plants, and soil dwelling invertebrates

Purpose and Rationale. Soil concentrations provide a measure of exposure, and screening level criteria indicate levels above which effects may occur. This measure of effect evaluates the potential for soil concentrations of COPCs in the Dead Creek floodplain to cause adverse effects.

Approach: The assessment compares measured concentrations of total contaminant concentrations in soils to existing benchmarks as summarized in Efroymson et al. (1997).

These soil benchmarks are developed from values that represent a LOAEL for plants, soil invertebrates, and wildlife (birds and mammals). Efroymson et al. (1997) selected the lowest of the available values as a soil benchmark.

Discussion: Tables 7-25, 7-27 (a through e), and 7-29 (a through d) compare concentrations detected in Dead Creek floodplain soil to soil screening benchmarks and background concentrations. The floodplain soil concentrations are represented by either the maximum concentration detected in or the 95% upper confidence limit (UCL) on the mean. For some areas, there were many more surface soil samples than sediment or surface water samples, and therefore a 95% UCL could be calculated. The background soil concentrations are represented as twice the average background soil concentration. The background data set comes from three soil samples selected during discussions with USEPA regarding development of the Site Sampling Plan workplan for the project. Soil constituents fall into several categories including:

1) constituents for which the maximum site concentrations exceed the benchmark (indicated in yellow on the reference tables);
2) constituents for which the lower of the site maximum or 95% UCL on the mean exceeds background (or the constituent was not detected in background soil) and no benchmark is available or no background concentration was available (indicated in green on the referenced tables);
3) constituents for which the maximum site concentration is less than the benchmark;
4) constituents for which the lower of the site maximum or 95% UCL on the mean is within background and there is no benchmark;

5) constituents detected at a frequency of less than 5%; and constituents of low toxicity.

The conclusions that can be drawn from these comparisons are:

Constituents in the first category may pose a potential risk to wildlife because soil concentrations exceed a toxicity benchmark;

Toxicity information is not available to draw conclusions about constituents in the second category;

Constituents in the third, fourth, and fifth are unlikely to present an ecological risk because the maximum concentration is less than a conservative benchmark, concentrations are consistent with background, low frequency of detection (less than 5%), or low toxicity (calcium, magnesium, and potassium).

The remainder of this section discusses the results of these comparisons for the sampling areas and soil sample types.

Undeveloped and Developed Area Surface Soils

These soil samples locations are shown on Figure 5-5. The samples are from depths of 0 to 6 inches. For these soils, the first category above represents constituents that are present in soil in at least one location at concentrations greater than a published ecological toxicity benchmark. Constituents in this category are 2,3,7,8-TCDD TEQs, total PCBs, arsenic, barium, cadmium, copper, lead, molybdenum, nickel, selenium, thallium, vanadium, and zinc. Table 7-26 identifies individual soil sample locations that exceed the benchmark. Note that many of the identified locations have concentrations slightly above the benchmark and within background. Constituents that exceed both background and the benchmark include: 2,3,7,8-TCDD TEQs (1 location out of 29 surface soil sampling locations); arsenic (1 location out of 65 surface soil sampling locations); barium (1 location out of 65 surface soil sampling locations); copper (2 locations out of 65); lead (2 locations out of 65); molybdenum (2 locations out of 65); nickel (1 location out of 65); selenium (16 locations out of 65); thallium (4 locations out of 65); vanadium (1 location out of 65); and zinc (3 locations out of 65). Detection limits for selenium in the remaining 49 samples were above the benchmark of 0.21 mg/kg.

Selenium was not detected in background soil. The Illinois Environmental Protection Agency (IEPA, 1994) reports a background range of less than 0.12 mg/kg to 2.6 mg/kg selenium in soils within metropolitan statistical areas. The average reported background concentration in these areas is 0.58 mg/kg. Therefore, the selenium concentrations detected in site surface soil are likely to be within the range of Illinois background, although selenium was not detected in the three site-specific background samples.

Few soil concentrations from the Undeveloped and Developed Areas exceed both soil benchmarks and background. These sample locations are scattered throughout the Dead Creek floodplain and do not represent a spatial or geographical pattern. The uncertainty in this screening is due to the lack of soil benchmarks for many compounds and, in the case of selenium, detection limits greater than benchmarks.

The second category represents constituents that are present in floodplain surface soils at concentrations above background, but for which little toxicity information is available. Many constituents fall into this second category (including herbicides, pesticides, SVOCs (mainly PAHs), and VOCs), because soil benchmarks are available for only a few of the compounds detected in soil.

Site G Surface Soils

Four surface soil samples (from depths of 0 to 6 inches) were collected from Site G (Figure 5-5; Table 7-27a). In these samples, copper was the only constituent that exceeded both the benchmark and background concentrations. This occurred in one out of four samples (Table 7-28). 2,3,7,8-TCDD TEQs, vanadium, and zinc exceeded benchmark concentrations but were within background. Twelve pesticides were at concentrations above background, but did not have screening level benchmarks. Concentrations of the remaining constituents were either lower than the benchmarks, lower than the background concentrations, or both.

Site G Subsurface Soils

The subsurface soil data from Site G (Figure 5-5) came from 22 historical soil samples. Some of these samples came from greater depths (up to depths of 30 feet) than one expects to find ecological receptors. As shown on Table 7-29a, of the 63 compounds detected in these samples, 16 compounds had maximum or UCL concentrations that exceeded a screening benchmark and background. In addition, one metal, arsenic, exceeded the screening benchmark but was at a concentration within background. Thirty-three compounds didn't have screening benchmarks, but concentrations detected in Site G subsurface soil exceeded background concentrations (or no background information was available). The exceedances noted here do not necessarily represent a risk to wildlife. Some of the samples came from deeper samples at which ecological exposures will not occur.

Site H Surface Soils

Four surface soils were collected from Site H (Figure 5-5). As shown on Tables 7-27b and 7-28, constituents that had concentrations above the screening benchmark and above background included 2,3,7,8-TCDD TEQs (in 3 out of 4 samples), arsenic (in 1 out of 4 samples), cadmium (in 2 out of 4 samples), copper (in 3 out of 4 samples), lead (in 2 out of 4 samples), molybdenum (in 3 out of 4 samples), nickel (in 1 out of 4 samples), selenium (in 3 out of 3 samples in which it was detected), silver (in 1 out of 4 samples), thallium (in the one sample in which it was detected), zinc (in 1 out of 4 samples), and PCBs (in 1 out of 4 samples). Vanadium exceeded its benchmark level, but was within background. One herbicide (2,4-DB), three metals (aluminum, cobalt, and mercury), nine pesticides, three PAHs, and two VOCs were detected at concentrations above background but did not have screening level benchmarks. Concentrations of the remaining constituents were either lower than the benchmarks, lower than the background concentrations, or both.

Site H Subsurface Soils

The subsurface soil data from Site H came from 11 historical soil samples. The depths of these soil samples are unknown. As shown on Table 7-29b, of the 68 compounds detected in these samples, 17 compounds had maximum or UCL concentrations that exceeded a screening benchmark and background. Forty-six compounds didn't have screening benchmarks, but concentrations detected in Site H subsurface soil exceeded background concentrations (or no background information was available). The exceedances noted here do not necessarily represent a risk to wildlife. These data were included to provide information on potential risks at Site H due to soils at depth greater than 6 inches, but may not represent wildlife exposures.

Site I Surface Soils

As shown on Tables 7-27c and 7-28, constituents detected in the four surface soil samples collected from Site I (Figure 5-5) at concentrations above background and above screening levels included: 2,3,7,8-TCDD TEQs (in 2 out of 4 samples), antimony (in 3 out of 4 samples), barium (in 1 out of 4 samples), cadmium (in 2 out of 4 samples), cobalt (in 1 out of 4 samples), copper (in 4 out of 4 samples), lead (in 4 out of 4 samples), molybdenum (in 4 out of 4 samples), nickel (in 1 out of 4 samples), selenium (in the 3 samples in which it was detected), silver (in 4 out of 4 samples), zinc (in 3 out of 4 samples) and PCBs (in 2 out of 4 samples). Arsenic and vanadium concentrations exceed screening benchmarks, but are less than background. One herbicide (2,4-DB), two metals (chromium and mercury), 16 pesticides, and19 SVOCs including PAHs were at concentrations above background, but did not have screening levels. Concentrations of the remaining constituents were either lower than the benchmarks, lower than the background concentrations, or both. Site I is covered with crushed stone and is used for parking trucks and heavy equipment. Its value as habitat for wildlife is extremely limited. Therefore, these exceedances of screening benchmarks in both surface and subsurface soil are unlikely to have an ecological significance.

Site I Subsurface Soils

The subsurface soil data from Site I came from 16 historical soil samples. The depths of these soil samples are unknown. As shown on Table 7-29c. of the 65 compounds detected in these samples, 18 compounds had maximum or UCL concentrations that exceeded a screening benchmark and background. In addition to these, one metal, arsenic was at a concentration that exceeded the benchmark, but was within background. Thirty-eight compounds did not have screening benchmarks, but concentrations detected in Site I subsurface soil exceeded background concentrations (or no background information was available). As stated above, the habitat for wildlife is extremely limited at Site I, and these exceedances are unlikely to have an ecological significance.

Site L Surface Soils

In Site L (Figure 5-5) surface soils, 2,3,7,8-TCDD TEQs (in 2 out of 4 samples), antimony (in 1 out of 4 samples), arsenic (in 4 out of 4 samples), cadmium (in 1 out of 4 samples), copper (in 1 out of 4 samples), lead (in 3 out of 4 samples), molybdenum (in 4 out of 4 samples), nickel (in 3 out of 4 samples), selenium (in 4 out of 4 samples), thallium (in 4 out of 4 samples), and zinc (in 1 out of 4 samples) were above screening levels and background as shown on Tables 7-27d and 7-28. Concentrations of vanadium and PCBs exceeded screening levels but were within background. Two metals (chromium and mercury), cyanide, nine pesticides, and 17 PAHs were at concentrations above background but did not have screening level benchmarks. Concentrations of the remaining constituents were either lower than the benchmarks, lower than the background concentrations, or both. Site L is covered with cinders and used for storing heavy equipment. Its value as habitat for wildlife is extremely limited. Therefore, these exceedances of screening benchmarks in surface and subsurface soil are unlikely to have an ecological significance.

Site L Subsurface Soils

The subsurface soil data from Site L came from 18 historical soil samples. The depths of these soil samples are unknown. As shown on Table 7-29d, of the 66 compounds detected in these samples, 14 compounds had maximum or UCL concentrations that exceeded a screening benchmark and background. Thirty-seven compounds didn't have screening benchmarks, but concentrations detected in Site L subsurface soil exceeded background concentrations (or no background information was available). As stated above, Site L provides very little habitat for ecological receptors. Therefore, exceedance of these screening values is likely to have little ecological significance.

Site N Surface Soils

At Site N (Figure 5-5), concentrations of 2,3,7,8-TCDD TEQs (in 1 out of 4 samples), barium (in 2 out of 4 samples), lead (in 1 out of 4 samples), and selenium (in the one sample in which it was detected) exceeded screening benchmarks and background concentrations in surface soils as shown on Tables 7-27e and 7-28. Copper, vanadium, and zinc concentrations exceeded screening levels, but were less than background. Six pesticides and ten PAHs were at concentrations above background but did not have screening level benchmarks. . Concentrations of the remaining constituents were either lower than the benchmarks, lower than the background concentrations, or both. There are no subsurface soil data available for Site N.

8.0 DISCUSSION OF ECOLOGICAL RISK

The assessment endpoints used in this evaluation are:

> Sustainability (survival, growth, and reproduction) of warm water fish species typical of those found in similar habitats (incorporates the assessment of benthic macroinvertebrates);
>
> Survival, growth, and reproduction of local populations of aquatic wildlife represented by mallard duck, great blue heron, tree swallow, muskrat, and river otter (incorporates the assessment of benthic macroinvertebrates including shrimp and clams);
>
> Survival, growth, and reproduction of individuals within the local bald eagle population that may overwinter near the site; and
>
> Survival, growth, and reproduction of local populations of terrestrial wildlife along the banks and floodplain of Dead Creek.

This section evaluates the results of each measure of exposure or effect and draws conclusions with regard to each assessment endpoint. Table 8-1 demonstrates this evaluation.

8.1 Sustainability (survival, growth, and reproduction) of warm water fish species typical of those found in similar habitats (incorporates the assessment of benthic macroinvertebrates)

Several COPCs including herbicides, metals, PCBs, pesticides, phthalates, PAHs, and dioxins were detected in fish from the Borrow Pit Lake indicating that fish at the site are exposed to these site-related compounds. Of the COPCs detected in fish tissue, only mercury was detected at concentrations exceeding a toxicity benchmark. Mercury concentrations exceeded a toxicity benchmark in one out of three brown bullhead samples and one out of three small forage fish (minnow) samples, but not in largemouth bass. This indicates that there is some potential for adverse effects on fish due to mercury at the site. Mercury was also detected in site sediment. These measures of exposure are given medium weight on Table 8-1 because they measure actual field conditions. They are assigned a low evidence of harm because, in general, they indicate exposure, not effect. Although mercury in fish tissue exceeds a toxicity benchmark, the benchmark is a literature value (given low to medium weight) and the evidence of harm is low. The only evidence in this case was the exceedance of benchmarks.

The COPCs in surface water that exceeded available criteria or guidelines were aluminum, barium, iron, and manganese. Surface water samples were unfiltered, and the detection of these common soil constituents in surface water may be due to sediment particles in the samples. This condition is likely to be present in other similar water bodies in the region. Therefore, concentrations of COPCs in surface water are unlikely to pose a risk to fish in the Borrow Pit Lake. These measurements were given a medium weight because although they measure actual field conditions, the exceedance of a benchmarks does not necessarily result in an effect.

Results of the evaluation of the benthic community indicated that benthic invertebrate community reflects the available habitat in Dead Creek and the Borrow Pit Lake. This measurement was given medium weight as measurement of actual field conditions. It was not given a high weight because it represents a measurement of a variable community taken at one point in time. Although concentrations of some COPCs were elevated above sediment guidelines for the protection of benthic invertebrates, it is not possible to differentiate the possible effects of COPCs in sediment from the effects of low water conditions. Even when water levels are higher, Dead Creek and the Borrow Pit Lake have silty, muddy sediments and stagnant water. The exceedance of sediment benchmarks was given low weight and a low evidence of harm. Results of toxicity testing were conflicting, but indicated toxicity in site sediment. This measure was given medium weight as an actual field measure. Overall, the prey base for fish in the Borrow Pit Lake (and Dead Creek Section F) reflects regional habitat conditions.

Some species of fish in the Borrow Pit Lake may be at risk due to body burdens of mercury elevated over a toxicity benchmark. Table 8-1 reflects low evidence of harm to fish from surface water and sediment. It should be noted that fish in many regions of the United States and Canada, in general, and Mississippi River basin in Illinois, in particular, have mercury concentrations in the same range and are not near known sources of mercury contamination. In general, fish at the site are affected by habitat conditions that are no different from conditions in other water bodies in the region including fluctuating water levels and a reduced prey base due to silty, muddy substrate. Potential risks due to site-related chemicals to fish within the Borrow Pit Lake appear to be negligible to small and are unlikely to influence the sustainability of these populations.

8.2 Survival, growth, and reproduction of local populations of aquatic wildlife represented by mallard duck, great blue heron, tree swallow, muskrat, and river otter (incorporates the assessment of benthic macroinvertebrates including shrimp and clams)

Wildlife species presence and use of the habitat appears to be high. This was given low weight because it is based on qualitative observations.

Some COPCs (metals, PAHs, herbicides, and pesticides) were detected in plants in Dead Creek Section F. This indicates that plants and wildlife that eat plants (mallards and muskrats) may be exposed to these COPCs. Food chain modeling indicated that these exposures do not result in an estimate of risk to mallards or muskrats (that is distinguishable from background risks) except when the most conservative assumptions are used with the data from the combined shallow and deeper "industry specific" sediment samples. The risks due to maximum concentrations of zinc from deeper sediment samples assuming that a mallard forages only at Dead Creek Section F year round is conservative and not representative of current conditions. Concentrations in the surface sediment were lower and did not present a risk to these species. The measure of exposure was given medium weight because it reflects actual site conditions. The measure of effect, the results of the food chain modeling, was given low weight because it is based on literature values of species behaviors and literature values for toxicity.

Since the only type of biota collected from Dead Creek Section F was plants, concentrations in other biota likely to be found there (i.e., snails and fish) were modeled using site-specific BAFs. These modeled concentrations were then evaluated using food chain models. Results indicated that COPCs that might be present in Dead Creek Section F fish do not present a risk to great blue heron or river otter. Modeled concentrations of COPCs in snails do not present a risk to mallards. Modeled concentrations of aluminum, antimony, copper, and 2,3,7,8-TCDD TEQs in snails could pose a risk to muskrats. The modeled doses of aluminum and copper exceeded the LOAEL dose, while aluminum and 2,3,7,8-TCDD exceeded the NOAEL, but not the LOAEL. This measure of effect, the results of the food chain modeling, was given low weight because it is based on literature values of species behaviors, modeled concentrations in site biota, and literature values for toxicity.

The modeling results for a tree swallow the feeds on aquatic insects in Dead Creek Section F and the Borrow Pit Lake indicate risks due to aluminum, chromium, mercury, zinc, Total PCBs, Total DDT, and dioxin when insect concentrations are modeled from sediment concentrations. This measure of effect, the results of the food chain modeling, was given low weight because it is based on literature values of species behaviors, modeled concentrations in site biota, and literature values for toxicity.

Concentrations of COPCs in surface water do not pose a risk to wildlife. As a comparison to literature values it was given a low to medium weight.

Some COPCs including herbicides, metals, PCBs, pesticides, phthalates, PAHs, and dioxin are present in fish from the Borrow Pit Lake. This measure of exposure was given a medium weight as a measure of actual site conditions. Food chain modeling indicated that these exposures do not result in risks to river otter that eat fish except under the most conservative conditions. It did indicate potential risks above a NOAEL dose (but below a LOAEL dose) to great blue heron that eat fish from the Borrow Pit Lake. This potential risk is due to mercury levels in some fish species, if herons forage mainly in the Borrow Pit Lake. If herons forage over a wider area (which is likely since the nesting areas are at least one mile away), no risk due to mercury is estimated (or the risk due to mercury is at a background level). This measure of effect, the results of the food chain modeling, was given low weight because it is based on literature values of species behaviors and literature values for toxicity. It was given a low evidence of harm, because the modeling (not actual observations) constitutes the only evidence of harm.

Some COPCs were detected in shrimp and clams from the Borrow Pit Lake. This indicates a potential for exposure of these organisms and wildlife that eat them. This measure of exposure was given a medium weight as a measure of actual site conditions. Food chain modeling indicated that these increased exposures do not result in risks above background to mallards, muskrats, or river otter. This measure of effect, the results of the food chain modeling, was given low weight because it is based on literature values of species behaviors and literature values for toxicity.

Wildlife appear to make ample use Dead Creek and the Borrow Pit Lake. The only potential risk due to COPCs measured at the site (above concentrations attributable to background) is to piscivorous birds due to mercury in fish. This potential for risk is considered to be low because the mercury dose in fish exceeds a no effects level, but not a level associated with effects on birds. In addition, the mercury concentration in fish is similar to levels measured in fish in many regions of the U.S. and Canada and throughout the Mississippi River basin in Illinois. The use of modeled concentrations in invertebrates in Dead Creek Section F resulted in predicted risks to muskrats.

8.3 Survival, growth, and reproduction of individuals within the local bald eagle population that may overwinter near the site

Food chain modeling did not predict risks to bald eagles that may eat fish from the Borrow Pit Lake. The measure of exposure (COPCs detected in Borrow Pit Lake fish) is given a medium weight as actual field measurements. The modeling results are given low weight because of the literature values for eagle behavior and toxicity used in the modeling.

8.4 Survival, growth, and reproduction of local populations of terrestrial wildlife along the banks and floodplain of Dead Creek

The measure of effect used to evaluate this assessment endpoint was a screening of floodplain soil concentrations against ecological benchmarks and background surface soil concentrations. This measure was given low weight and low evidence of harm because it consists of a conservative screening against benchmark values which in turn are based on literature information on toxicity.

For the larger floodplain represented by Undeveloped Area and Developed Area soils, this screening indicated that some COPCs exceeded ecological benchmarks and background. However, only a few locations had COPC concentrations that exceeded both the ecological benchmark and background. The locations where concentrations exceed both screening values and background concentrations were scattered over the floodplain and did not exhibit a spatial pattern. Therefore, although a conservative screening analysis indicated that there may be some risks to terrestrial wildlife in the floodplain of Dead Creek, the scattered nature of the exceedances indicates infrequent exposure of wildlife to these scattered areas. Therefore, the screening analysis of floodplain soils does not indicate wide spread ecological risks in this area.

There were also exceedances of screening benchmarks at Sites G, H, I, L, and N. The exceedances in the surface soils at Sites G, H, and N indicate there may be some potential risk to wildlife in these areas. There were exceedances in surface soils at Sites I and L. However, since these Sites are crushed stone or cinder covered and used for parking trucks and heavy equipment, they provide little ecological habitat. Therefore, exceedances at Sites I and L are unlikely to result in ecological risk. Exceedance of screening benchmarks in subsurface soils at Sites G, H, I, and L provide some measure of potential risk if these soils become uncovered. However, because the some of the samples came from depths greater than one expects to find ecological receptors, the exceedances of benchmarks in subsurface soil do not necessarily indicate ecological risk.

9.0 DISCUSSION AND MANAGEMENT OF UNCERTAINTIES AND EXPOSURE ASSUMPTIONS

To insure that uncertainties in the assessment have been identified and appropriately addressed and managed to insure the results lead to decisions that are environmentally protective, this section presents potential sources of uncertainty. This section of the report identifies the major sources of uncertainty along with actions that have been taken to manage this uncertainty within the assessment.

9.1 Exposure Assessment Uncertainty

A variety of measurement endpoints are selected to reduce the uncertainty inherent in the evaluation of exposure in complex ecological systems. While it is impossible to evaluate the condition of every species and local population using the site, it is important to select species that may use the site, are representative of larger feeding guilds, and have a high potential for exposure.

9.1.1 Uncertainty Due to the Selection of Sampling Locations

The number and location of surface water, sediment, biota and soil sampling locations appear to be sufficient to characterize concentrations in these media in Dead Creek and its floodplain.

Surface water samples were not filtered prior to analysis for metals. The use of total metals concentrations for comparison to National Recommended Water Quality Criteria overstates actual exposure and results in an overestimate of risk. Although the NRWQC as used in this assessment were adjusted for total metals, it is still likely that the concentrations detected in surface water were due to entrained sediment particles, rather than metals dissolved in surface water.

Sediment samples represented both current exposures (depth of 0 to 2 inches) and potential future exposure events due to sediment scours ("industry specific" samples generally from depths of 0 to 12 inches). The use of a 0 to 2" (or even smaller layer for freshwater biota) is a standard approach for assessing current risks and was arrived at based on discussions with Dr. Chris Ingersoll of USGS. After the work was completed, the Agency requested an evaluation of potential exposure to deeper sediment. The industry specific samples were not analyzed for the same number of constituents as were the ecological sediment triad samples. Therefore, there is some uncertainty as to concentrations of some constituents in deeper sediment. This may have lead to an underestimate of potential future risk because, generally, constituent concentrations were higher in deeper sediments. However, use of the combined shallow and deeper samples in this ecological risk assessment results in an overestimate of current risk, because concentrations in the surficial, accessible sediment are lower.

The numbers of surface soil samples in the Undeveloped and Developed Areas of the Dead Creek flood plain provide sufficient coverage of these areas. Soil samples collected from these areas came from depths of 0 to 6 inches and 3 to 6 feet. The surface samples were used in ecological risk assessment because ecological exposures are not expected to occur at depths of 3 to 6 feet. However, since some receptors, such as earthworms and burrowing mammals, may be exposed to soils deeper than 6 inches, the lack of data from these depths results in uncertainty in the assessment.

Surface soil samples at Sites G, H, I, L, and N were also collected from depths of 0 to 6 inches. Two of these sites, I and L, are covered with cinders and/or crushed stone and used for parking trucks and storing heavy equipment. Any estimate of ecological risk in these areas is an overestimate in that ecological receptors would not be expected to occur there with any frequency due to the lack of habitat.

Historical subsurface soil data were evaluated for Sites G, H, I, and L. These data were not validated, detection limits were not available, and data represent a variety of depths. Statistics for these data used only the detected values. The use of these data results in an overestimate of ecological risk. The use of detected data only results in a high bias of average or upper confidence limit concentrations. In addition, the use of samples from depths greater than approximately 2 feet results in concentrations not representative of ecological exposures.

9.1.2 Uncertainty Due to Selection of Reference Areas

The selection of reference areas creates uncertainty in any ecological assessment because no two waterbodies or areas are similar in all aspects. For this reason, great care was taken in the selection of reference areas. Significant effort was made to select appropriate reference areas and to obtain agreement with regulatory agencies on the areas selected. The selection process is also fraught with difficulty in that suitable areas may be on private land and unavailable for sampling. The selected areas provide suitable reference for most of Dead Creek and Borrow Pit Lake. Dead Creek Section F had fewer similarities to the reference areas than the rest of Dead Creek or the Borrow Pit Lake. At the direction of the regulatory agencies, the comparison to reference areas was removed from the ecological risk assessment because they disagreed with the selected reference areas.

The lack of a suitable reference areas introduces great uncertainty in the risk assessment. It leads to evaluating ecological risks at a site out of context and without any reference to the environmental setting that may result in non-site related ecological risks. In the area of Dead Creek, non-site related risks are likely present due to use of agricultural chemicals (herbicides and pesticides) in the surrounding watershed and aerial deposition of contaminants from off-site sources (power plants and automotive traffic). In addition, Dead Creek receives runoff from roadway and residential areas in the surrounding watershed. Without comparison to a suitable reference water body, effects that may be present in Dead Creek and Borrow Pit Lake absent the presence of COPCs (toxicity due to non-site related chemicals, low benthic invertebrate abundance and diversity due to low water levels, low dissolved oxygen, and silty substrate) can not be evaluated on a regional basis. Therefore, the lack of a comparison to a comparable reference area is likely to result in an overestimation of risk in Dead Creek.

9.1.3 Uncertainty due to time of sampling

The present assessment represents conditions at one point in time and may not reflect conditions throughout the year or in the future. This demonstrates variability in the data more than uncertainty. The low water levels at the time of sampling may have confounded some of the elements of the risk assessment. The number and species of benthic invertebrates present may have been depressed by these conditions, although these conditions were similar throughout the region. It is also likely that low water conditions occur seasonally. In the absence of additional remediation, sedimentation could continue to bury and isolate COPCs identified in sediment, thereby reducing exposure to surface-dwelling benthic invertebrates and the organisms that prey upon them. Alternatively, storm events and erosion could uncover contaminated sediments, making them more available to aquatic organisms.

9.1.4 Uncertainty in Selection of COPCs

This risk assessment selects COPCs based on a comparison of concentrations in surface water and sediment to toxicity benchmarks and guidelines. Surface water and sediment benchmarks are not available for all of the compounds detected. If a compound did not have a benchmark, it was carried through the risk assessment. In some cases, the potential risks due to this compound were evaluated in another portion of the risk assessment, if another type of toxicity value was available for it (e.g., tissue toxicity benchmark or wildlife NOAEL dose). In other cases, no toxicity values were available for the compound, and no conclusions could be drawn regarding its potential risk.

9.2 Uncertainty in the Effects Assessment

9.2.1 Food Chain Modeling Uncertainty

There is uncertainty in the estimates of ingestion rates for wildlife. We rely on studies that present conservative estimates of quantity of food, water and soil in each species' diet (USEPA 1993; Beyer et al. 1994). For example, we assume that some species incidentally ingest sediment during feeding

The actual diets of the species analyzed in the food chain models include a larger diversity of food types than represented in the food chain models. The assessment relied on site data (plants, clam, fish, and shrimp) where possible and representative food types (both plant and animal tissue). It cannot capture each unique diet item in the diet of wildlife.

The quantity of sediment that an animal ingests while consuming plants or invertebrates is uncertain. The assumptions used in the food chain models are conservative to minimize the effect of the uncertainty. For certain COPCs, sediment is a significant component of the total dose. In certain cases, and for certain compounds, tissue concentrations represent a significant component of the total dose.

The food chain models were applied for two conditions; the first took into account the species foraging area and whether or not the species migrates from the site. The second condition assumed that the species forages only at Dead Creek Section F or the Borrow Pit Lake year round. There is uncertainty inherent in both sets of assumptions. The second set of assumptions greatly overestimates risk for species that migrate or range over a wide area.

Some of the food chain models used modeled concentration in biota. The biota concentrations were modeled based on site-specific BAFs and literature values. The use of these modeled concentrations results in uncertainty in the analysis an overestimate of risk. The site-specific BAFs were calculated as an average BAF using data both from the site (the entire length of Dead Creek and the Borrow Pit) and from the reference areas. Because concentrations of COPCs were generally higher at in Dead Creek, especially in the upstream areas, the BAFs from those areas were lower than those calculated for the reference areas. However, averaging these values into the assessment resulted in higher BAFs and higher modeled concentration in biota. The use of literature BAFs for aquatic insects lead to uncertainty because these values are not specific to the Dead Creek area.

9.2.2 *Uncertainty in toxicological dose benchmarks*

The development of toxicological benchmarks involves uncertainty because they are derived from laboratory studies and must be extrapolated to the field. In many cases, extrapolations are also made between species. This is standard practice in ecological risk assessment and yields benchmarks that are likely to be conservative. Testing is often rigorous, however the tests are generally performed on standard laboratory species and then the results are adjusted for other species based on body weight. While the species assessed are not standard laboratory species, they are species with readily available toxicological benchmarks.

There is considerable uncertainty in the development of dietary dose benchmarks for wildlife because few studies are available on effects on wildlife. For example, very little data are available for aluminum toxicity to mammals. A literature search for aluminum toxicity to the muskrat returned zero articles. In many cases, it is necessary to extrapolate from studies conducted on laboratory species to effects in wildlife species of concern at the site. The magnitude of uncertainty associated with this extrapolation is unknown, but is often estimated to be within a factor of ten (Dourson and Stara, 1983). However, it could be higher for some contaminants. For example, the toxicity benchmark doses that were derived for aluminum and selenium for mammals are quite low and likely to over-predict risk or predict risk at background concentrations. The assumption that COPCs are 100% bioavailable from surface water, sediment, biota, and soil also is likely to lead to the overestimation of risk.

9.3 Uncertainty in Risk Characterization

This assessment calculates hazard indices using both NOAELs and LOAELs to capture uncertainty in the risk estimates. The assessment concludes that hazard indices that reflect a comparison to a NOAEL and are less than one do not indicate a risk of potential harm, and that hazard indices that reflect a comparison to a LOAEL and exceed one do indicate a risk of potential harm. However, there is considerable uncertainty for cases in which the NOAEL dose is exceeded, but not the LOAEL dose. In those cases, it cannot be established that there is no risk, because exposure is not below the NOAEL, and it cannot be established that there is risk, because exposure is not above the LOAEL.

The goal of this assessment is to examine the risk of harm to *populations* of aquatic organisms and aquatic and terrestrial wildlife. The assessment uses the hazard index approach to estimate this risk, but this does not provide the basis for estimating the likelihood that the population will be affected if a hazard index exceeds one. The simplifying assumption is made that if a hazard index based on a LOAEL for a measurement endpoint based on growth, reproduction, or survival exceeds one, then there is a risk to the population. However, effects on individuals may not always affect the population. This conservative assumption is used because few methods exist to predict population level effects.

10.0 FINDINGS

The findings of the ecological risk assessment for Sauget Area I are presented below:

10.1 Creek Section F Upstream of Borrow Pit Lake

Surface Water

- Surface water concentrations of aluminum, barium, and manganese exceeded National Recommended Water Quality Criteria. Surface water samples were unfiltered; and these metals are typical soil constituents.

Sediments

- Arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel and zinc concentrations exceed TECs/PECs or LELs/SELs.

- PCBs, Total DDT, aldrin, alpha chlordane, dieldrin, gamma chlordane, heptachlor, heptachlor epoxide, and fluoranthene concentrations exceed TECs or LELs.

Benthic Invertebrates

- A benthic invertebrate survey indicated that these organisms are present and making use of the habitat, but that the silty substrate and low water conditions limit the numbers and types of organisms that are present.

- Amphipod toxicity testing indicated no acute or chronic toxicity.

- Chironomid toxicity testing indicated acute toxicity in Creek Section F and other waterbodies in the region far from sources of site-related COPCs.

Fish

- A few small minnows were observed in Creek Section F upstream of the Borrow Pit Lake. They were not abundant enough to collect for analysis.

Wildlife

- Wildlife appear to use Creek Section F to the same degree as other waterbodies in the region.

- Food chain modeling using measured concentrations in sediment (0 to 2 inch depth), surface water, and plants indicated:

  No risks to mallards foraging in this area year round.

  No risk to muskrats foraging year round with the exception of a risk due to aluminum concentration in sediment that is indistinguishable from aluminum concentrations in regional background soil.

- Food chain modeling using measured concentrations in combined shallow and deeper sediment, surface water, and plants indicated:

  A potential risk to mallards due to the maximum concentration of zinc detected in the deeper sediment.

  No risk to muskrats foraging year round with the exception of a risk due to aluminum in sediment that is indistinguishable from aluminum concentrations in regional background soil.

- Food chain modeling using measured concentrations in sediment and surface water and estimated biota (fish or invertebrate) concentrations calculated using site-specific or literature BAFs indicated:

  No risk to river otter eating fish;

  No risk to great blue heron eating fish;

  No risk to a mallard eating invertebrates;

  Potential risk to a muskrat eating invertebrates due to aluminum, antimony, copper, and dioxin;

  Potential risk to a tree swallow eating emergent aquatic insects due to aluminum, cadmium, chromium, mercury, zinc, PCBs, DDT, and dioxin.

10.2 Borrow Pit Lake

Surface Water

- Surface water concentrations of aluminum, barium, iron, and manganese exceeded National Recommended Water Quality Criteria. Surface water samples were unfiltered and these metals are typical soil constituents.

Sediments

- Arsenic, cadmium, copper, iron, lead, manganese, nickel and zinc concentrations exceed TECs/PECs and LELs/SELs.

- DDE, DDT, gamma-BHC and heptachlor epoxide concentrations exceed TECs and LELs.

Benthic Invertebrates

- A benthic invertebrate survey indicated that these organisms are present and making use of the habitat, but that the silty substrate and low water conditions limit the numbers and types of organisms that are present.

- Amphipod toxicity testing indicated:

  No acute effects on survival.

  Statistically lower growth in the acute test period (10 days) in these organisms at two of the three stations in Borrow Pit Lake.

  No chronic effects on survival, growth, or reproduction in the 42 day test period.

- Chironomid toxicity testing indicated:

  Acute toxicity in the 10 day test period in one of three stations in the Borrow Pit Lake and other waterbodies in the region far from sources of site-related COPCs.

  Chronic effects on survival, emergence, and reproduction in the two other (out of three) stations in Borrow Pit Lake in the 20 day test period and in other waterbodies in the region far from sources of site-related COPCs.

Fish

- Fish in the Borrow Pit Lake appear to be at risk due to seasonally low water levels and drought conditions that reduce the available habitat to a shallow puddle.

- Fish may be at risk due to body burdens of mercury; however, these measured body burdens are within the range measured in the Illinois portion of the Mississippi River Basin.

Wildlife

- Wildlife appear to use the Borrow Pit lake to the same degree as other water bodies in the region.

- Food chain modeling using measured concentrations in sediment (0 to 2 inch depth or combined shallow or deeper sediment), surface water, and fish indicated:

  Great blue herons and similar piscivorous birds may be at risk due to consumption of mercury in fish if they forage only in the Borrow Pit Lake. This potential for risk is considered low because:

    Herons forage over a three mile radius, and are therefore not restricted to foraging at the Borrow Pit Lake;

    Mercury concentrations in fish do not exceed the level associated with adverse effects on birds.

  No risks to river otter using average concentrations in environmental media.

  A potential risk to river otter using maximum concentrations and restricting their foraging to the Borrow Pit Lake.

- Food chain modeling using measured concentrations in sediment (0 to 2 inch depth or combined shallow or deeper sediment), surface water, and invertebrates indicated:

  No risks to mallards foraging year round on shrimp.

  No risk to muskrats foraging year round on clams with the exception of a risk due to aluminum in sediment that is indistinguishable from aluminum concentrations in regional background soil.

- Food chain modeling using measured concentrations in sediment and surface water and estimated biota (invertebrate) concentrations calculated using site-specific or literature BAFs indicated:

  Potential risk to a tree swallow eating emergent aquatic insects due to aluminum, chromium, mercury, zinc, DDT, and dioxin.

- Food chain modeling indicates that bald eagles are not at risk unless they:

  Feed year round at the Borrow Pit Lake (bald eagles overwinter in this portion of the Mississippi River basin but are not present there in the breeding season); and

  Feed only at the Borrow Pit Lake (their foraging area along 2 to 4.5 miles of a river).

10.3 Dead Creek Floodplain Soils

Concentrations of some COPCs exceed ecological benchmarks and background soil concentrations at scattered locations in the floodplain.

These scattered exceedances of benchmarks do not have a spatial distribution and do not indicate widespread risk.

10.4 Waste Disposal Areas

Screening benchmarks were exceeded in surface soils at Sites G, H, I, L, and N.

Screening benchmarks were exceeded in subsurface soils at Sites G, H, I, and L.

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TABLES

Table 2-1
Water, Sediment, and Habitat Parameters of Dead Creek Section F, Borrow Pit Lake, and Reference Areas
Sauget Area I

	Creek Section F	Borrow Pit Lake	Ref-1 (Prairie du Pont Creek)	Ref 2-1 (Long Slash Creek)	Ref 2-2
Water Quality Parameters					
Average pH	7.87	9.07	7.3	8	8.1
Average Total Suspended Solids (mg/L)	8.3	84	485	340	370
Average Total Dissolved Solids (mg/L)	347	370	420	310	320
Sediment Parameters					
Average Total Organic Carbon (mg/kg dw)	80333	42667	17500	13000	20000
Grain size					
Average % Gravel	1.8	0	0	0	0
Average % Sand	13.1	4.7	5.9	0.4	3.9
Average % Silt	42.5	62.0	57.8	65.9	54.5
Average % Clay	42.6	33.3	36.3	33.7	41.6
Habitat					
Habitat Assessment Score[1]	181	167	115	92	115

[1]Habitat Assessment Field Data Sheets (Low Gradient Streams) were completed for each creek section and reference areas (USEPA, 1997). These were presented in the field sampling report for the project (O'Brien & Gere Engineers, Inc., September 2000).

TABLE 4-1
ASSESSMENT ENDPOINTS
AND ASSOCIATED MEASURES OF EFFECT
DEAD CREEK AND THE BORROW PIT LAKE
SAUGET AREA I

Assessment Endpoint 1: Sustainability of warm water fish

Measure of effect 1a: body burdens of COPCs in selected fish species as a measure of exposure and effects (compared to benchmark values).

Measure of effect 1b: COPC concentrations in surface water as compared to applicable water quality criteria for protection of fish and wildlife.

Measure of effect 1c: sustainability of a benthic macroinvertebrate community that can serve as a prey base for fish:

Concentration of COPCs in sediment;

Field assessment of benthic macroinvertebrate community structure;

Sediment toxicity tests.

Assessment Endpoint 2: Survival, growth, and reproduction of local populations of aquatic wildlife as represented by the, mallard duck, great blue heron, muskrat, and river otter

Measure of effect 2a: Wildlife species composition and habitat use.

Measure of effect 2b: Concentration of COPCs in aquatic/marsh plants for use in evaluating exposure via the food chains for mallard duck and muskrat.

Measure of effect 2c: Concentration of COPCs in surface waters in comparison to wildlife benchmarks.

Measure of effect 2d: Concentration of COPCs in fish for use in evaluating exposure via the food chain for great blue heron and river otter.

Measure of effect 2e: Concentration of COPCs in macroinvertebrates (shrimp and/or clams) for use in evaluating exposure via the food chain for mallard duck, river otter and muskrat*.

Assessment Endpoint 3: Survival, growth, and reproduction of individuals within the local bald eagle population that may overwinter near the site

Measure of effect 3a: Concentration of COPCs in fish for use in evaluating exposure via the food chain.

Assessment Endpoint 4: Survival, growth, and reproduction of local populations of terrestrial wildlife along the banks and floodplain of Dead Creek

Measure of effect 4a: Soil screening effect levels for the protection of wildlife, plants, and soil dwelling invertebrates.

* includes modeling of aquatic insect concentrations and food chain evaluation of a tree swallow, an insectivorous bird.

Table 5-1
List of Sample Stations, Dates, and QA/QC Samples for Fish Tissue Analysis
Dead Creek, Borrow Pit and Reference Areas
Sauget Area I

Sample Type	Sample ID	Date	Location	Species	Sample Type	Tissue Type	No. in Composite	Total Wt (g)	Notes*
Largemouth bass whole bodies	LMBBP COMP-01	10/4/99	Borrow Pit	Largemouth Bass	Composite	Whole Body	3	1467.8	MS/MSD Sample
	LMBBP COMP-02	11/3/99	Borrow Pit	Largemouth Bass	Composite	Whole Body	2	769.7	
	LMBBP COMP-03	11/1/99	Borrow Pit	Largemouth Bass	Composite	Whole Body	3	1004	Split with Weston
	LMBREF1 COMP-01	11/1/99	Ref-01	Largemouth Bass	Composite	Whole Body	3	1321.7	
	LMBREF1 COMP-02	11/1/99	Ref-01	Largemouth Bass	Composite	Whole Body	3	1027.3	
	LMBREF2 COMP-01	10/8/99	Ref-02-2	Largemouth Bass	Composite	Whole Body	3	922.3	
	LMBREF2 COMP-02	11/2/99	Ref-02-2	Largemouth Bass	Composite	Whole Body	3	1642.2	
			CS-F						None present
	FFBP COMP-01	10/4/99	Borrow Pit	*Lepomis*	Composite	Whole Body	14	115	
	FFBP COMP-02	10/6/99	Borrow Pit	*Lepomis*	Composite	Whole Body	151	96.1	
	FFBP COMP-03	10/6/99	Borrow Pit	*Lepomis*	Composite	Whole Body	157	92	
	FFREF1 COMP-01	10/8/99	Ref-01	*Lepomis*	Composite	Whole Body	3	120.8	
	FFREF2 COMP-01	10/8/99	Ref-02-2	Crappie	Composite	Whole Body	38	126.9	
	FFREF2 COMP-02*	10/8/99	Ref-02-2	4 LMBass,1 minnow and 4 *Lepomis*	Composite	Whole Body	9	69.7	
	FFREF2 COMP-03	10/8/99	Ref-02-1	Minnow	Composite	Whole Body	278	78.6	
Bullheads whole bodies	BBBP COMP-01	11/1/99	Borrow Pit	Bullhead	Composite	Whole Body	9	513.7	Field duplicate
	BBBP COMP-02	11/1/99	Borrow Pit	Bullhead	Composite	Whole Body	3	352.2	
	BBBP COMP-03	10/7/99	Borrow Pit	Bullhead	Composite	Whole Body	4	227.4	
	BBREF1-2 COMP-01	10/8/99	Ref-01	Bullhead	Composite	Whole Body	3	148.8	
	BBREF1-2 COMP-02	10/8/99	Ref-01	Bullhead	Composite	Whole Body	4	259.6	
	BBREF2-2 COMP-01	11/2/99	Ref-02-2	Bullhead	Individual	Whole Body	1	509.2	MS/MSD sample

*At the request of the regulatory agencies, this sample was not included in the assessment because it was comprised of different species.

Table 5-2
Comparison of Maximum Surface Water Concentrations to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Site Maximum Detected[1]	Illinois[2] Acute WQ Standards	Illinois[2] Chronic WQ Standards	NAWQ Criteria[3] CMC	NAWQ Criteria[3] CCC	Tier II Values[4] Secondary Acute Value	Tier II Values[4] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[5]	Preliminary Screening	Comments
Herbicides (ug/l)										
2,4,5-T									Out	not detected in sw
2,4,5-TP (Silvex)									Out	not detected in sw
2,4-D									Out	not detected in sw
2,4-DB									Out	not detected in sw
Dalapon									Out	not detected in sw
Dicamba									Out	not detected in sw
Dichloroprop									Out	not detected in sw
Dinoseb									Out	not detected in sw
MCPA									Out	not detected in sw
MCPP									Out	not detected in sw
Pentachlorophenol at pH 7.4				13	10				Out	not detected in sw
Metals/Inorganics (mg/l)										
Aluminum	3.4			0.75[a]	0.087[a]				In	greater than criteria
Antimony						0.18	0.03		Out	not detected in sw
Arsenic	0.018	0.36	0.19	0.34	0.15	0.066[b]	0.0031[b]		Out	no exceedance
Barium	0.32					0.11	0.004		In	greater than Tier II
Beryllium						0.035	0.00066		Out	not detected in sw
Cadmium		0.024	0.0021	0.011	0.0046				Out	not detected in sw
Calcium	89							116	Out	low toxicity, nutrient
Chromium	0.0041	3.3[c]/0.016[d]	0.39[c]/0.011[d]	3.4[c] / 0.016[d]	0.18[c]/0.011[d]				Out	no exceedance
Cobalt	0.0018					1.5	0.023		Out	no exceedance
Copper	0.012	0.037	0.023	0.029	0.018				Out	no exceedance
Cyanide, Total		0.022	0.0052	0.022	0.0052				Out	not detected in sw
Iron	8.7				1				In	greater than criteria
Lead	0.02	0.26	0.055	0.22	0.0087				In	greater than NAWQ criteria
Magnesium	33							82	Out	low toxicity, nutrient
Manganese	1.7					2.3	0.12		In	greater than criteria
Mercury		0.0026	0.0013	0.0014	0.00077		0.0013		Out	not detected in sw
Molybdenum	0.004					16	0.37		Out	no exceedance
Nickel	0.021			0.91	0.1				Out	no exceedance
Potassium	7.6							53	Out	low toxicity, nutrient
Selenium					0.005				Out	not detected in sw
Silver				0.016			0.00036		Out	not detected in sw
Sodium	24							680	Out	low toxicity, nutrient
Thallium						0.11	0.012		Out	not detected in sw
Vanadium	0.014					0.28	0.02		Out	no exceedance
Zinc	0.076			0.23	0.23				Out	no exceedance
Fluoride (mg/l)	0.29								Out	water quality parameter
Hardness as $CaCO_3$ (mg/l)	350								Out	water quality parameter
Ortho-Phosphate-P (mg/l)	0.83								Out	water quality parameter
pH	9.7				6.5 - 9				Out	water quality parameter
Suspended Solids (mg/l)	160								Out	water quality parameter
Total Dissolved Solids (mg/l)	480								Out	water quality parameter
Total Phosphorus (mg/l)	1.2								Out	water quality parameter
PCB (ug/l)					0.014[e]					
Decachlorobiphenyl									Out	not detected in sw
Dichlorobiphenyl									Out	not detected in sw
Heptachlorobiphenyl									Out	not detected in sw
Hexachlorobiphenyl									Out	not detected in sw
Monochlorobiphenyl									Out	not detected in sw
Nonachlorobiphenyl									Out	not detected in sw
Octachlorobiphenyl									Out	not detected in sw
Pentachlorobiphenyl									Out	not detected in sw
Tetrachlorobiphenyl									Out	not detected in sw
Trichlorobiphenyl									Out	not detected in sw

Table 5-2

Comparison of Maximum Surface Water Concentrations to Standards and Guidelines

Dead Creek Sector F and Borrow Pit Lake

Sauget Area I

Compounds	Site Maximum Detected[1]	Illinois[1] Acute WQ Standards	Illinois[1] Chronic WQ Standards	NAWQ Criteria[2] CMC	NAWQ Criteria[2] CCC	Tier II Values[3] Secondary Acute Value	Tier II Values[3] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[3]	Preliminary Screening	Comments
Pesticides (ug/l)										
4,4'-DDD						0.19	0.011		Out	not detected in sw
4,4'-DDE									Out	not detected in sw
4,4'-DDT				1.1	0.001		0.013[i]		Out	not detected in sw
Aldrin				3					Out	not detected in sw
Alpha Chlordane				2.4[e]	0.0043[e]				Out	not detected in sw
alpha-BHC	0.001					39[h]	2.2[h]		Out	no exceedance
beta-BHC	0.02					39[h]	2.2[h]		Out	no exceedance
delta-BHC	0.0022					39[h]	2.2[h]		Out	no exceedance
Dieldrin	0.001			0.24	0.056				Out	no exceedance
Endosulfan I	0.0024			0.22[f]	0.056[f]		0.51		Out	no exceedance
Endosulfan II				0.22[f]	0.056[f]		0.51		Out	not detected in sw
Endosulfan sulfate	0.0032								In	no criteria
Endrin	0.00095			0.086	0.036				Out	no exceedance
Endrin aldehyde	0.0032								In	no criteria
Endrin ketone	0.0027								In	no criteria
Gamma Chlordane									Out	not detected in sw
gamma-BHC (Lindane)	0.0038			0.95					Out	no exceedance
Heptachlor	0.0029			0.52	0.0038	0.125	0.0069		Out	no exceedance
Heptachlor epoxide	0.00096			0.52	0.0038				Out	no exceedance
Methoxychlor					0.03		0.019		Out	not detected in sw
Toxaphene				0.73	0.0002				Out	not detected in sw
SVOC (ug/l)										
1,2,4-Trichlorobenzene						700	110		Out	not detected in sw
1,2-Dichlorobenzene						260	14		Out	not detected in sw
1,3-Dichlorobenzene						630	71		Out	not detected in sw
1,4-Dichlorobenzene						180	15		Out	not detected in sw
2,2'-Oxybis(1-Chloropropane)									Out	not detected in sw
2,4,5-Trichlorophenol									Out	not detected in sw
2,4,6-Trichlorophenol									Out	not detected in sw
2,4-Dichlorophenol									Out	not detected in sw
2,4-Dinitrophenol									Out	not detected in sw
2,4-Dinitrotoluene									Out	not detected in sw
2,6-Dinitrotoluene									Out	not detected in sw
2-Chloronaphthalene									Out	not detected in sw
2-Chlorophenol									Out	not detected in sw
2-Methylnaphthalene									Out	not detected in sw
2-Methylphenol (o-cresol)						230	13		Out	not detected in sw
2-Nitroaniline									Out	not detected in sw
2-Nitrophenol									Out	not detected in sw
3,3'-Dichlorobenzidine									Out	not detected in sw
3-Methylphenol/4-Methylphenol									Out	not detected in sw
3-Nitroaniline									Out	not detected in sw
4,6-Dinitro-2-methylphenol									Out	not detected in sw
4-Bromophenylphenyl ether							1.5		Out	not detected in sw
4-Chloro-3-methylphenol									Out	not detected in sw
4-Chloroaniline									Out	not detected in sw
4-Chlorophenylphenyl ether									Out	not detected in sw
4-Nitroaniline									Out	not detected in sw
4-Nitrophenol						1200	300		Out	not detected in sw
Acenaphthene									Out	not detected in sw
Acenaphthylene									Out	not detected in sw
Anthracene						13	0.73		Out	not detected in sw
Benzo(a)anthracene						0.49	0.027		Out	not detected in sw
Benzo(a)pyrene						0.24	0.014		Out	not detected in sw
Benzo(b)fluoranthene									Out	not detected in sw
Benzo(g,h,i)perylene									Out	not detected in sw
Benzo(k)fluoranthene									Out	not detected in sw

Table 5-2
Comparison of Maximum Surface Water Concentrations to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Site Maximum Detected[1]	Illinois[1] Acute WQ Standards	Illinois[1] Chronic WQ Standards	NAWQ Criteria[2] CMC	NAWQ Criteria[2] CCC	Tier II Values[3] Secondary Acute Value	Tier II Values[3] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[4]	Preliminary Screening	Comments
bis(2-Chloroethoxy)methane									Out	not detected in sw
bis(2-Chloroethyl)ether									Out	not detected in sw
bis(2-Ethylhexyl)phthalate						27	3		Out	not detected in sw
Butylbenzylphthalate							19		Out	not detected in sw
Carbazole									Out	not detected in sw
Chrysene									Out	not detected in sw
Di-n-butylphthalate						190	35		Out	not detected in sw
Di-n-octylphthalate								708	Out	not detected in sw
Dibenzo(a,h)anthracene									Out	not detected in sw
Dibenzofuran						66	3 7		Out	not detected in sw
Diethylphthalate						1800	210		Out	not detected in sw
Dimethylphthalate									Out	not detected in sw
Fluoranthene	0 7							15	Out	no exceedance
Fluorene						70	3 9		Out	not detected in sw
Hexachlorobenzene									Out	not detected in sw
Hexachlorobutadiene									Out	not detected in sw
Hexachlorocyclopentadiene									Out	not detected in sw
Hexachloroethane						210	12		Out	not detected in sw
Indeno(1,2,3-cd)pyrene									Out	not detected in sw
Isophorone									Out	not detected in sw
N-Nitroso-di-n-propylamine									*Out*	*not detected in sw*
N-Nitrosodiphenylamine						3800	210		Out	not detected in sw
Naphthalene						190	12		Out	not detected in sw
Nitrobenzene									Out	not detected in sw
Pentachlorophenol									Out	not detected in sw
Phenanthrene	0 7							200	Out	no exceedance
Phenol									Out	not detected in sw
Pyrene									Out	not detected in sw
VOC (ug/l)										
1,1,1-Trichloroethane						200	11		Out	not detected in sw
1,1,2,2-Tetrachloroethane						2100	610		Out	not detected in sw
1,1,2-Trichloroethane						5200	1200		Out	not detected in sw
1,1-Dichloroethane						830	47		Out	not detected in sw
1,1-Dichloroethene						450	25		Out	not detected in sw
1,2-Dichloroethane						8800	910		Out	not detected in sw
1,2-Dichloropropene									Out	not detected in sw
2-Butanone (MEK)						240000	14000		Out	not detected in sw
2-Hexanone						1800	99		Out	not detected in sw
4-Methyl-2-pentanone (MIBK)						2200	170		Out	not detected in sw
Acetone	18					28000	1500		Out	no exceedance
Benzene	1.7					2300	130		Out	less than criteria
Bromodichloromethane									Out	not detected in sw
Bromoform									Out	not detected in sw
Bromomethane (Methyl bromide)									Out	not detected in sw
Carbon disulfide						17	0.92		Out	not detected in sw
Carbon tetrachloride						180	9.8		Out	not detected in sw
Chlorobenzene						1100	64		Out	not detected in sw
Chloroethane									Out	not detected in sw
Chloroform						490	28		Out	not detected in sw
Chloromethane									Out	not detected in sw
cis-1,3-Dichloropropene									Out	not detected in sw
Cis/Trans-1,2-Dichloroethene									Out	not detected in sw
Dibromochloromethane									Out	not detected in sw
Ethylbenzene						130	7.3		Out	not detected in sw
Methylene chloride (Dichloromethane)						26000	2200		Out	not detected in sw
Styrene									Out	not detected in sw
Tetrachloroethene						830	98		Out	not detected in sw
Toluene						120	9.8		Out	not detected in sw
trans-1,3-Dichloropropene									Out	not detected in sw

Table 5-2
Comparison of Maximum Surface Water Concentrations to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Site Maximum Detected[1]	Illinois[1] Acute WQ Standards	Illinois[1] Chronic WQ Standards	NAWQ Criteria[2] CMC	NAWQ Criteria[2] CCC	Tier II Values[3] Secondary Acute Value	Tier II Values[3] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[3]	Preliminary Screening	Comments
Trichloroethene						440	47		Out	not detected in sw
Vinyl chloride									Out	not detected in sw
Xylenes, Total						230[j] / 32[k]	13[j] / 1.8[k]		Out	not detected in sw
Dioxins (ug/l)										
1,2,3,4,6,7,8,9-OCDD	0.00143								In	COPC in sediment
1,2,3,4,6,7,8,9-OCDF	0.00026								In	COPC in sediment
1,2,3,4,6,7,8-HpCDD	0.0000692								In	COPC in sediment
1,2,3,4,6,7,8-HpCDF	0.0000505								In	COPC in sediment
1,2,3,4,7,8,9-HpCDF	0.000548								In	COPC in sediment
1,2,3,4,7,8-HxCDD									In	COPC in sediment
1,2,3,4,7,8-HxCDF	0.000024								In	COPC in sediment
1,2,3,6,7,8-HxCDD									In	COPC in sediment
1,2,3,6,7,8-HxCDF	0.0000089								In	COPC in sediment
1,2,3,7,8,9-HxCDD									In	COPC in sediment
1,2,3,7,8,9-HxCDF									In	COPC in sediment
1,2,3,7,8-PeCDD									In	COPC in sediment
1,2,3,7,8-PeCDF									In	COPC in sediment
2,3,4,6,7,8-HxCDF									In	COPC in sediment
2,3,4,7,8-PeCDF									In	COPC in sediment
2,3,7,8-TCDD									In	COPC in sediment
2,3,7,8-TCDF									In	COPC in sediment
Total HpCDD	0.000128								In	COPC in sediment
Total HpCDF	0.0006								In	COPC in sediment
Total HxCDD	0.0000902								In	COPC in sediment
Total HxCDF	0.000581								In	COPC in sediment
Total PeCDD									In	COPC in sediment
Total PeCDF									In	COPC in sediment
Total TCDD									In	COPC in sediment
Total TCDF									In	COPC in sediment
Total TEQ (mammal)	1.901E-05						3.1E-09		In	greater than Great Lakes Tier II

Notes:

[a]Criterion is for total recoverable Aluminum at pH 6.5 - 9.0; USEPA says Water-Effects ratios may be more appropriate.
[b]Criterion is for Arsenic V
[c]Criterion is for Chromium III
[d]Criterion is for Chromium VI
[e]Criterion is for Chlordane
[f]Criterion is for alpha- and beta-Endosulfan
[g]Criterion is for PCBs
[h]Criterion is for BHC forms other than gamma-BHC
[i]Criterion is for DDT
[j]Criterion is for Xylene
[k]Criterion is for m-Xylene

[1] Illinois, 1999. Title 35 of the Illinois Administrative Code, Subtitle C, Chapter I, Part 302 Water Quality Standards, Subpart B.
[2] USEPA, 1999. National Recommended Water Quality Criteria - Correction, Office of Water, EPA 82-2-Z-99-001 (April 1999)
[3] Suter, G.W. II, and C.L. Tsao, 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effect on Aquatic Biota: 1996 Revision. Risk Assessment, Health Sciences Research Division, Oak R
Tennessee, ES/ER/TM-96/R2.
out = excluded from further consideration in surface water
in = selected as a COPC
For the purposes of COPC selection, hardness dependent criteria were calculated at a hardness of 220 mg/l as $CaCO_3$ (the lowest value detected on site and therefore, the most conservative value to use.
Results in ug/l for organic constituents; mg/l for inorganic constituents

Table 5-3
Comparison of Maximum Sediment Concentrations to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake
Sauget Area I

Compounds	Maximum Detected[4]	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	Preliminary Screening	Comment
Herbicides (ug/kg)						
2,4,5-T						
2,4,5-TP (Silvex)						
2,4-D	23				IN	No criteria
2,4-DB					OUT	Not detected in sediment.
Dalapon					OUT	Not detected in sediment.
Dicamba					OUT	Not detected in sediment.
Dichloroprop					OUT	Not detected in sediment.
Dinoseb					OUT	Not detected in sediment.
MCPA					OUT	Not detected in sediment.
MCPP					OUT	Not detected in sediment.
Pentachlorophenol					OUT	Not detected in sediment.
Metals (mg/kg)						
Aluminum	17000				IN	No criteria.
Antimony	4.7				IN	No criteria.
Arsenic	19	9.79	7.24	6	IN	Greater than criteria.
Barium	420				IN	No criteria.
Beryllium	0.89				IN	No criteria.
Cadmium	47	0.99	0.676	0.6	IN	Greater than criteria.
Calcium	17000				OUT	Common nutrient.
Chromium	38	43.4	52.3	26	IN	Greater than criteria.
Cobalt	13			50	OUT	Less than criteria.
Copper	410/5400	31.6	18.7	16	IN	Greater than criteria.
Cyanide, Total				0.1	OUT	Not detected in sediment.
Iron	38000			20000	IN	Greater than criteria
Lead	320	35.8	30.2	31	IN	Greater than criteria.
Magnesium	6800				OUT	Common nutrient.
Manganese	1400			460	IN	Greater than criteria.
Mercury	1.1	0.18	0.13	0.2	IN	Greater than criteria.
Molybdenum	3.7				IN	No criteria.
Nickel	390	22.7	15.9	16	IN	Greater than criteria.
Potassium	2900				OUT	Common nutrient
Selenium					OUT	Not detected in sediment.
Silver	0.79		0.733	0.5	IN	Greater than criteria
Sodium					OUT	Not detected in sediment.
Thallium					OUT	Not detected in sediment.
Vanadium	51				IN	No criteria.
Zinc	3700/11000	121	124	120	IN	Greater than criteria.
pH	7.06				OUT	NA
Total Organic Carbon (mg/kg dry weight)	140000				OUT	NA

Table 5-3
Comparison of Maximum Sediment Concentrations to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake
Sauget Area I

Compounds	Maximum Detected[4]	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	Preliminary Screening	Comment
PCBs and Pesticides (ug/kg)						
Decachlorobiphenyl	ND/460				IN	Included in "industry specific" sediment only
Dichlorobiphenyl					OUT	Not detected in sediment.
Heptachlorobiphenyl	ND/260				IN	Included in "industry specific" sediment only
Hexachlorobiphenyl	22/19				IN	Included as Total PCBs
Monochlorobiphenyl					OUT	Not detected in sediment.
Nonachlorobiphenyl	ND/270				IN	Included in "industry specific" sediment only
Octachlorobiphenyl	ND/27				IN	Included in "industry specific" sediment only
Pentachlorobiphenyl	66/3700				IN	Included as Total PCBs
Tetrachlorobiphenyl	ND/1600				IN	Included in "industry specific" sediment only
Trichlorobiphenyl	ND/17				IN	Included in "industry specific" sediment only
Total PCBs	83/6470.5	59.8	21.6	70	IN	Greater than criteria
4,4'-DDD	3.8	4.88	1.22	8	IN	Greater than criteria
4,4'-DDE	11	3.16	2.07	5	IN	Greater than criteria
4,4'-DDT*	4.5	4.16	1.19	8	IN	Greater than criteria
Total DDT	43	5.28	3.89	7	IN	Greater than criteria
Aldrin	4.1			2	IN	Greater than criteria
Alpha Chlordane**	5.3	3.24	2.26	7	IN	Greater than criteria
alpha-BHC				6	OUT	Not detected in sediment.
beta-BHC				5	OUT	Not detected in sediment.
delta-BHC	0.34				IN	No criteria.
Dieldrin	9.3	1.9	0.715	2	IN	Greater than criteria.
Endosulfan I	5.7				IN	No criteria.
Endosulfan II	8.1				IN	No criteria.
Endosulfan sulfate	9.5				IN	No criteria.
Endrin	1.7	2.22		3	OUT	Less than criteria.
Endrin aldehyde	14				IN	No criteria.
Endrin ketone	10				IN	No criteria.
Gamma Chlordane**	17	3.24	2.26	7	IN	Greater than criteria.
gamma-BHC (Lindane)	4.8	2.37	0.32	3	IN	Greater than criteria.
Heptachlor	0.93			0.3 NEL	IN	Greater than criteria.
Heptachlor epoxide	5.4	2.47		5	IN	Greater than criteria.
Methoxychlor	24				IN	No criteria.
Toxaphene					OUT	Not detected in sediment.

Table 5-3
Comparison of Maximum Sediment Concentrations to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake
Sauget Area I

Compounds	Maximum Detected[4]	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	Preliminary Screening	Comment
SVOCs ug/kg						
1,2,4-Trichlorobenzene					OUT	Not detected in sediment.
1,2-Dichlorobenzene					OUT	Not detected in sediment.
1,3-Dichlorobenzene					OUT	Not detected in sediment.
1,4-Dichlorobenzene					OUT	Not detected in sediment.
2,2'-Oxybis(1-Chloropropane)					OUT	Not detected in sediment.
2,4,5-Trichlorophenol					OUT	Not detected in sediment.
2,4,6-Trichlorophenol					OUT	Not detected in sediment.
2,4-Dichlorophenol					OUT	Not detected in sediment.
2,4-Dinitrophenol					OUT	Not detected in sediment.
2,4-Dinitrotoluene					OUT	Not detected in sediment.
2,6-Dinitrotoluene					OUT	Not detected in sediment.
2-Chloronaphthalene					OUT	Not detected in sediment.
2-Chlorophenol					OUT	Not detected in sediment.
2-Methylnaphthalene			20.2		OUT	Not detected in sediment.
2-Methylphenol (o-cresol)					OUT	Not detected in sediment.
2 Nitroaniline					OUT	Not detected in sediment.
2-Nitrophenol					OUT	Not detected in sediment.
3,3'-Dichlorobenzidine					OUT	Not detected in sediment.
3-Methylphenol/4-Methylphenol					OUT	Not detected in sediment.
3-Nitroaniline					OUT	Not detected in sediment.
4,6-Dinitro-2-methylphenol					OUT	Not detected in sediment.
4-Bromophenylphenyl ether					OUT	Not detected in sediment.
4-Chloro-3-methylphenol					OUT	Not detected in sediment.
4-Chloroaniline					OUT	Not detected in sediment.
4-Chlorophenylphenyl ether					OUT	Not detected in sediment.
4-Nitroaniline					OUT	Not detected in sediment.
4-Nitrophenol					OUT	Not detected in sediment.
Acenaphthene			6.71		OUT	Not detected in sediment.
Acenaphthylene			5.87		OUT	Not detected in sediment.
Anthracene		57.2	46.9	220	OUT	Not detected in sediment.
Benzo(a)anthracene		108	74.8	320	OUT	Not detected in sediment.
Benzo(a)pyrene		150	88.8	370	OUT	Not detected in sediment.
Benzo(b)fluoranthene					OUT	Not detected in sediment.
Benzo(g,h,i)perylene				170	OUT	Not detected in sediment.
Benzo(k)fluoranthene				240	OUT	Not detected in sediment.
bis(2-Chloroethoxy)methane					OUT	Not detected in sediment.
bis(2-Chloroethyl)ether					OUT	Not detected in sediment.
bis(2-Ethylhexyl)phthalate			182		OUT	Not detected in sediment.
Butylbenzylphthalate					OUT	Not detected in sediment.

Table 5-3
Comparison of Maximum Sediment Concentrations to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake
Sauget Area I

Compounds	Maximum Detected[4]	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	Preliminary Screening	Comment
Carbazole					OUT	Not detected in sediment.
Chrysene	74	166	108	340	OUT	Less than criteria.
Di-n-butylphthalate					OUT	Not detected in sediment.
Di-n-octylphthalate					OUT	Not detected in sediment.
Dibenzo(a,h)anthracene		33	6.22	60	OUT	Not detected in sediment.
Dibenzofuran					OUT	Not detected in sediment.
Diethylphthalate					OUT	Not detected in sediment.
Dimethylphthalate					OUT	Not detected in sediment.
Fluoranthene	130	423	113	750	IN	Greater than criteria.
Fluorene		77.4	21.2	190	OUT	Not detected in sediment.
Hexachlorobenzene					OUT	Not detected in sediment.
Hexachlorobutadiene					OUT	Not detected in sediment.
Hexachlorocyclopentadiene					OUT	Not detected in sediment.
Hexachloroethane					OUT	Not detected in sediment.
Indeno(1,2,3-cd)pyrene				200	OUT	Not detected in sediment.
Isophorone					OUT	Not detected in sediment.
N-Nitroso-di-n-propylamine					OUT	Not detected in sediment.
N-Nitrosodiphenylamine					OUT	Not detected in sediment.
Naphthalene		176	34.6		OUT	Not detected in sediment.
Nitrobenzene					OUT	Not detected in sediment.
Pentachlorophenol					OUT	Not detected in sediment.
Phenanthrene		204	86.7	560	OUT	Not detected in sediment.
Phenol					OUT	Not detected in sediment.
Pyrene		195	153	490	OUT	Not detected in sediment.
Total PAHs	440	1610	1684	4000	OUT	Less than criteria
VOCs ug/kg						
1,1,1-Trichloroethane					OUT	Not detected in sediment.
1,1,2,2-Tetrachloroethane					OUT	Not detected in sediment.
1,1,2-Trichloroethane					OUT	Not detected in sediment.
1,1-Dichloroethane					OUT	Not detected in sediment.
1,1-Dichloroethene					OUT	Not detected in sediment.
1,2-Dichloroethane					OUT	Not detected in sediment.
1,2-Dichloropropane					OUT	Not detected in sediment.
2-Butanone (MEK)					OUT	Not detected in sediment.
2-Hexanone					OUT	Not detected in sediment.
4-Methyl-2-pentanone (MIBK)					OUT	Not detected in sediment.
Acetone					OUT	Not detected in sediment.
Benzene					OUT	Not detected in sediment.
Bromodichloromethane					OUT	Not detected in sediment.
Bromoform					OUT	Not detected in sediment.

Table 5-3
Comparison of Maximum Sediment Concentrations to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake
Sauget Area I

Compounds	Maximum Detected[4]	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	Preliminary Screening	Comment
Bromomethane (Methyl bromide)					OUT	Not detected in sediment.
Carbon disulfide					OUT	Not detected in sediment.
Carbon tetrachloride					OUT	Not detected in sediment.
Chlorobenzene					OUT	Not detected in sediment.
Chloroethane					OUT	Not detected in sediment.
Chloroform					OUT	Not detected in sediment.
Chloromethane					OUT	Not detected in sediment.
cis-1,3-Dichloropropene					OUT	Not detected in sediment.
Cis/Trans-1,2-Dichloroethene					OUT	Not detected in sediment.
Dibromochloromethane					OUT	Not detected in sediment.
Ethylbenzene	11				IN	No criteria.
Methylene chloride (Dichloromethane)					OUT	Not detected in sediment.
Styrene					OUT	Not detected in sediment.
Tetrachloroethene					OUT	Not detected in sediment.
Toluene					OUT	Not detected in sediment.
trans-1,3-Dichloropropene					OUT	Not detected in sediment.
Trichloroethene					OUT	Not detected in sediment.
Vinyl chloride					OUT	Not detected in sediment.
Xylenes, Total					OUT	Not detected in sediment.
Dioxin TEQ (mammal) pg/g	333				IN	No criteria.

Notes: Except where noted, concentrations in ug/kg for organic constituens; mg/kg for inorganic constituents.
[1] Threshold Effects Concentration -
[2] Sediment Quality Assessment
[3] Lowest Effects Level - Persaud, D., R.
[4] A blank in this column indicates that compound was not detected in sediment in this location. If two values appear, the first is for ecological sediment samples (0 to 2 inch depth) and the second is for "industry specific" sediment samples (sediment cores to refusal; generally about 1 to 1.5 foot depth).
* Ontario and Sediment Quality Guideline values are for 2,4'-DDT and 4,4'-DDT combined
** Florida, Ontario, and Sediment Quality Guideline values are for Chlordane
OUT = excluded from further consideration in sediment
IN = selected as COPC
NA = Not applicable
ND = Not detected
NEL = No-Effect Level

Table 5-4
Selection of COPCs for Ecological Risk Assessment
Sauget Area I

Compounds	Maximum Detected Sediment	Sediment Screened In	Maximum Detected in Surface Water	Surface Water Screened In	Maximum Detected LMB Site	Maximum Detected BB Site	Maximum Detected Clam Site	Maximum Detected Forage Fish Site	Maximum Detected Plants Site	Maximum Detected Shrimp Site	Selected as COPC
HERBICIDES											
2,4,5-T											NO
2,4,5-TP (Silvex)											NO
2,4-D	23	IN									YES
2,4-DB								10			YES
Dalapon											NO
Dicamba					1.9			2.6			YES
Dichloroprop						6.6	32	6.7	7		YES
Dinoseb											NO
MCPA					1800			3300			YES
MCPP							4000				YES
Pentachlorophenol								2.2		1.8	YES
INORGANICS											
Aluminum	17000	IN	3.4	IN	33	18	13	52	44	28	YES
Antimony	4.7	IN							0.13	0.16	YES
Arsenic	19	IN	0.015				0.96		0.58		YES
Barium	420	IN	0.32	IN							YES
Beryllium	0.89	IN									YES
Cadmium	47	IN					0.12				YES
Calcium	17000		89								NO
Chromium	38	IN	0.0041		0.93	0.7	1.1	0.32	0.097	0.23	YES
Cobalt	13		0.0015								NO
Copper	410/5400	IN	0.012		0.68	0.89	0.99	1.7	2.1	8.3	YES
Cyanide, Total											NO
Iron	38000	IN	8.7	IN							YES
Lead	320	IN	0.02	IN	0.064	0.25	0.25	0.59	2.1	0.39	YES
Magnesium	6800		33								NO
Manganese	1400	IN	1.7	IN							YES
Mercury	1.1	IN				0.26		0.6			YES
Molybdenum	3.7	IN	0.004								YES
Nickel	390	IN	0.021						2.6		YES
Potassium	2900		7.6								NO
Selenium					0.63			0.54			YES
Silver	0.79	IN					0.02			0.09	YES
Sodium			24								NO
Thallium											NO
Vanadium	51	IN	0.014								YES
Zinc	3700/11000	IN	0.075		19	22	22	33	26	16	YES

Table 5-4
Selection of COPCs for Ecological Risk Assessment
Sauget Area I

Compounds	Maximum Detected Sediment	Sediment Screened In	Maximum Detected in Surface Water	Surface Water Screened In	Maximum Detected LMB Site	Maximum Detected BB Site	Maximum Detected Clam Site	Maximum Detected Forage Fish Site	Maximum Detected Plants Site	Maximum Detected Shrimp Site	Selected as COPC
PCBs											
Decachlorobiphenyl	ND/460	IN*									
Dichlorobiphenyl											
Heptachlorobiphenyl	ND/460	IN*			21						
Hexachlorobiphenyl	22/19	IN			150	52		22			
Monochlorobiphenyl											
Nonachlorobiphenyl	ND/270	IN*									
Octachlorobiphenyl	ND/270	IN*									
Pentachlorobiphenyl	00/3700	IN			130	52		8.7			
Tetrachlorobiphenyl	ND/1600	IN*			46						
Trichlorobiphenyl	ND/17	IN*									
Total PCBs	83/6470.5	IN			320	104		39			YES
PESTICIDES											
4,4'-DDD	3.8	IN									YES
4,4'-DDE	11	IN			21	29		10			YES
4,4'-DDT	4.5	IN									YES
Total DDT	43	IN			21	29		10			YES
Aldrin	4.1	IN									YES
Alpha Chlordane	5.3	IN				12			0.81		YES
alpha-BHC			0.001								NO
beta-BHC			0.02								NO
delta-BHC	0.34	IN	0.0022								YES
Dieldrin	9.3	IN	0.001								YES
Endosulfan I	5.7	IN	0.0024								YES
Endosulfan II	8.1	IN									YES
Endosulfan sulfate	9.5	IN	0.0032	IN							YES
Endrin	1.7		0.00095								NO
Endrin aldehyde	14	IN	0.0032	IN							YES
Endrin ketone	10	IN	0.0027	IN							YES
Gamma Chlordane	17	IN			19	11			3.1		YES
gamma-BHC (Lindane)	4.8	IN	0.0038								YES
Heptachlor	0.93	IN	0.0029		1.5	2.8	2.3		1.9		YES
Heptachlor epoxide	5.4	IN	0.00096								YES
Methoxychlor	24	IN					5.4				YES
Toxaphene											NO

Table 5-4
Selection of COPCs for Ecological Risk Assessment
Sauget Area I

Compounds	Maximum Detected Sediment	Sediment Screened In	Maximum Detected in Surface Water	Surface Water Screened In	Maximum Detected LMB Site	Maximum Detected BB Site	Maximum Detected Clam Site	Maximum Detected Forage Fish Site	Maximum Detected Plants Site	Maximum Detected Shrimp Site	Selected as COPC
SVOC											
1,2,4-Trichlorobenzene											NO
1,2-Dichlorobenzene											NO
1,3-Dichlorobenzene											NO
1,4-Dichlorobenzene											NO
2,2'-Oxybis(1-Chloropropane)											NO
2,4,5-Trichlorophenol											NO
2,4,6-Trichlorophenol											NO
2,4-Dichlorophenol											NO
2,4-Dinitrophenol											NO
2,4-Dinitrotoluene											NO
2,6-Dinitrotoluene											NO
2-Chloronaphthalene											NO
2-Chlorophenol											NO
2-Methylnaphthalene											NO
2-Methylphenol (o-cresol)											NO
2-Nitroaniline											NO
2-Nitrophenol											NO
3,3'-Dichlorobenzidine											NO
3-Methylphenol/4-Methylphenol											NO
3-Nitroaniline											NO
4,6-Dinitro-2-methylphenol											NO
4-Bromophenylphenyl ether											NO
4-Chloro-3-methylphenol											NO
4-Chloroaniline											NO
4-Chlorophenylphenyl ether											NO
4-Nitroaniline											NO
4-Nitrophenol											NO
Acenaphthene											NO
Acenaphthylene									32		YES
Anthracene											NO
Benzo(a)anthracene											NO
Benzo(a)pyrene									140		YES
Benzo(b)fluoranthene									59		YES
Benzo(g,h,i)perylene									360		YES
Benzo(k)fluoranthene									52		YES
bis(2-Chloroethoxy)methane											NO
bis(2-Chloroethyl)ether											NO
bis(2-Ethylhexyl)phthalate						97	170	230			YES
Butylbenzylphthalate											NO
Carbazole											NO
Chrysene	74										NO
Di-n-butylphthalate					32						YES
Di-n-octylphthalate											NO
Dibenzo(a,h)anthracene								48	76		YES

Table 5-4
Selection of COPCs for Ecological Risk Assessment
Sauget Area I

Compounds	Maximum Detected Sediment	Sediment Screened In	Maximum Detected in Surface Water	Surface Water Screened In	Maximum Detected LMB Site	Maximum Detected BB Site	Maximum Detected Clam Site	Maximum Detected Forage Fish Site	Maximum Detected Plants Site	Maximum Detected Shrimp Site	Selected as COPC
Dibenzofuran											NO
Diethylphthalate						18	120	37		44	YES
Dimethylphthalate											NO
Fluoranthene	130	IN	0.7								YES
Fluorene											NO
Hexachlorobenzene											NO
Hexachlorobutadiene											NO
Hexachlorocyclopentadiene											NO
Hexachloroethane											NO
Indeno(1,2,3-cd)pyrene								54	300		YES
Isophorone											NO
N-Nitroso-di-n-propylamine											NO
N-Nitrosodiphenylamine											NO
Naphthalene											NO
Nitrobenzene											NO
Pentachlorophenol											NO
Phenanthrene			0.7								NO
Phenol											NO
Pyrene											NO
Total PAHs	440		1.4					102	1019		YES
VOC											
1,1,1-Trichloroethane											NO
1,1,2,2-Tetrachloroethane											NO
1,1,2-Trichloroethane											NO
1,1-Dichloroethane											NO
1,1-Dichloroethene											NO
1,2-Dichloroethane											NO
1,2-Dichloropropane											NO
2-Butanone (MEK)											NO
2-Hexanone											NO
4-Methyl-2-pentanone (MIBK)											NO
Acetone			18								NO
Benzene			1.7								NO
Bromodichloromethane											NO
Bromoform											NO
Bromomethane (Methyl bromide)											NO
Carbon disulfide											NO
Carbon tetrachloride											NO
Chlorobenzene											NO
Chloroethane											NO
Chloroform											NO
Chloromethane											NO
cis-1,3-Dichloropropene											NO
Cis/Trans-1,2-Dichloroethene											NO
Dibromochloromethane											NO

Table 5-4
Selection of COPCs for Ecological Risk Assessment
Sauget Area I

Compounds	Maximum Detected Sediment	Sediment Screened In	Maximum Detected in Surface Water	Surface Water Screened In	Maximum Detected LMB Site	Maximum Detected BB Site	Maximum Detected Clam Site	Maximum Detected Forage Fish Site	Maximum Detected Plants Site	Maximum Detected Shrimp Site	Selected as COPC
Ethylbenzene	11	IN									NO
Methylene chloride (Dichloromethane)											NO
Styrene											NO
Tetrachloroethene											NO
Toluene											NO
trans-1,3-Dichloropropene											NO
Trichloroethene											NO
Vinyl chloride											NO
Xylenes, Total											NO
Dioxin TEQ (mammal)	0.333	IN	1.01E-05	IN	0.0035	0.0037	0.00015	0.0018	0.0002	0.00022	**YES**

LMB = Largemouth Bass
BB = Brown Bullhead
2,4-Dimethylphenol was also detected in Site plants at 51 ug/kg
Sediment and tissue concentrations in ug/kg except metals which are in mg/kg; surface water concentrations are in ug/L except metals which are mg/L
*Indicates detected in "industry specific" sediment samples only.

Table 7-1
Comparison of Largemouth Bass Concentrations to Toxicity Benchmarks
Sauget Area I

Compound	Benchmark	Site Maximum	Site Average	Reference Maximum	Reference Average
Herbicides (ug/kg)					
2,4-D	NA	ND	ND	ND	ND
2,4-DB	NA	ND	ND	ND	ND
Dicamba	NA	1.9	5.6	ND	ND
Dichloroprop	NA	ND	ND	ND	ND
MCPA	NA	1800	1267	ND	ND
MCPP	NA	ND	ND	ND	ND
Pentachlorophenol	9600	ND	ND	ND	ND
Metals (mg/kg)					
Aluminum, Total	NA	33	20	81	41
Antimony	NA	ND	ND	ND	ND
Arsenic, Total	0.52	ND	ND	ND	ND
Barium, Total	NA	ND	ND	ND	ND
Cadmium, Total	0.5	ND	ND	ND	ND
Chromium, Total	NA	0.93	0.64	0.36	0.28
Copper, Total	12.1	0.68	0.54	0.8	0.5
Iron	NA	ND	ND	ND	ND
Lead, Total	26.2	ND	ND	ND	ND
Manganese	NA	ND	ND	ND	ND
Mercury	0.25	0.064	0.043	0.1	0.1
Molybdenum	NA	ND	ND	ND	ND
Nickel, Total	NA	ND	ND	ND	ND
Selenium	1.6	0.63	0.49	0.86	0.60
Silver	NA	ND	ND	ND	ND
Zinc, Total	NA	19	17	15	11
Total PCBs (ug/kg)	950	320	237	ND	ND
Pesticides (ug/kg)					
4,4'-DDD	600	ND	ND	ND	ND
4,4'-DDE	29200	21	14	6.6	5.3
4,4'-DDT	3800	ND	ND	ND	ND
Aldrin	157	ND	ND	ND	ND
Alpha Chlordane	16600 [a]	ND	ND	ND	ND
delta-BHC	NA	ND	ND	ND	ND
Dieldrin	3700	ND	ND	5.6	5.0
Endosulfan I	195 [b]	ND	ND	ND	ND
Endosulfan II	195 [b]	ND	ND	ND	ND
Endosulfan sulfate	195 [b]	ND	ND	ND	ND
Endrin aldehyde	150 [c]	ND	ND	ND	ND
Endrin ketone	150 [c]	ND	ND	ND	ND
Gamma Chlordane	16600 [a]	19	12	ND	ND
gamma-BHC (Lindane)	NA	ND	ND	ND	ND
Heptachlor	5700	1.5	2.8	ND	ND
Heptachlor epoxide	3200	ND	ND	ND	ND
Methoxychlor	128	ND	ND	ND	ND
SVOC (ug/kg)					
bis(2-ethylhexyl)phthalate	NA	ND	ND	ND	ND
Di-n-butylphthalate	NA	32	67	20	52
Diethylphthalate	NA	ND	ND	ND	ND
Acenaphthylene	NA	ND	ND	ND	ND
Fluoranthene	NA	ND	ND	ND	ND
Benzo(b)fluoranthene	NA	ND	ND	ND	ND
Benzo(k)fluoranthene	NA	ND	ND	ND	ND
Benzo(a)pyrene	23.9	ND	ND	ND	ND
Benzo(g,h,i)perylene	NA	ND	ND	ND	ND
Indeno(1,2,3-c-d)pyrene	NA	ND	ND	ND	ND
Dibenz(a,h)anthracene	NA	ND	ND	ND	ND
2,3,7,8-TCDD, TEQ, ug/kg	0.05	0.003 *	0.0021 *	0.00019*	0.00011*

* Maximum and Average TEQs for fish were used for comparison to benchmark.
a Benchmark value is for Chlordane
b Benchmark value for Endosulfan was used
c Benchmark values for Endrin were used

Table 7-2
Comparison of Brown Bullhead Concentrations to Toxicity Benchmarks
Sauget Area I

Compound	Benchmark		Site Maximum		Site Average		Reference Maximum	Reference Average
Herbicides (ug/kg)								
2,4-D	NA		ND		ND		ND	ND
2,4-DB	NA		ND		ND		ND	ND
Dicamba	NA		ND		ND		ND	ND
Dichloroprop	NA		6.6		35.5		ND	ND
MCPA	NA		ND		ND		8600	3533
MCPP	NA		ND		ND		ND	ND
Pentachlorophenol	9600		ND		ND		ND	ND
Metals (mg/kg)								
Aluminum, Total	NA		18		13		66	34
Antimony	NA		ND		ND		ND	ND
Arsenic, Total	0.52		ND		ND		ND	ND
Barium, Total	NA		ND		ND		ND	ND
Cadmium, Total	0.5		ND		ND		ND	ND
Chromium, Total	NA		0.7		0.4		0.5	0.4
Copper, Total	12.1		0.89		0.84		1	1
Iron	NA		ND		ND		ND	ND
Lead, Total	26.2		0.25		0.24		0.23	0.21
Manganese	NA		ND		ND		ND	ND
Mercury	0.25		0.3		0.1		0.1	0.08
Molybdenum	NA		ND		ND		ND	ND
Nickel, Total	NA		ND		ND		ND	ND
Selenium	1.6		ND		ND		0.5	0.40
Silver	NA		ND		ND		ND	ND
Zinc, Total	NA		22		20		24	20
Total PCBs (ug/kg)	950		102		63		ND	ND
Pesticides (ug/kg)								
4,4'-DDD	600		ND		ND		1.8	5.3
4,4'-DDE	29200		29		18		12	8.8
4,4'-DDT	3800		ND		ND		ND	ND
Aldrin	157		ND		ND		ND	ND
Alpha Chlordane	16600	a	12		7		2.5	1.6
delta-BHC	NA		ND		ND		ND	ND
Dieldrin	3700		ND		ND		3.8	2.8
Endosulfan I	195	b	ND		ND		ND	ND
Endosulfan II	195	b	ND		ND		ND	ND
Endosulfan sulfate	165	b	ND		ND		ND	ND
Endrin aldehyde	150	c	ND		ND		ND	ND
Endrin ketone	150	c	ND		ND		ND	ND
Gamma Chlordane	16600	a	11		7		6.2	6.4
gamma-BHC (Lindane)	NA		ND		ND		1.2	3.0
Heptachlor	5700		2.8		3.2		ND	ND
Heptachlor epoxide	3200		ND		ND		ND	ND
Methoxychlor	128		ND		ND		ND	ND
SVOC (ug/kg)								
bis(2-ethylhexyl)phthalate	NA		97		89		47	59
Di-n-butylphthalate	NA		ND		ND		ND	ND
Diethylphthalate	NA		18		63		25	65
Acenaphthylene	NA		ND		ND		ND	ND
Fluoranthene	NA		ND		ND		ND	ND
Benzo(b)fluoranthene	NA		ND		ND		ND	ND
Benzo(k)fluoranthene	NA		ND		ND		ND	ND
Benzo(a)pyrene	23.9		ND		ND		ND	ND
Benzo(g,h,i)perylene	NA		ND		ND		ND	ND
Indeno(1,2,3-c-d)pyrene	*NA*		*ND*		*ND*		*ND*	*ND*
Dibenz(a,h)anthracene	NA		ND		ND		ND	ND
2,3,7,8-TCDD, TEQ, ug/kg	0.05		0.003	*	0.002	*	0.00069*	0.00045*

*Maximum and Average TEQs for fish were used for comparison to benchmarks
a Benchmark value is for Chlordane
b Benchmark value for Endosulfan was used
c Benchmark values for Endrin were used

Table 7-3
Comparison of Forage Fish Concentrations to Toxicity Benchmarks
Sauget Area I

Compound	Benchmark	Site Maximum	Site Average	Reference Maximum	Reference Average
Herbicides (ug/kg)					
2,4-D	NA	ND	ND	ND	ND
2,4-DB	NA	10	8.8	10	6.3
Dicamba	NA	2.6	11	ND	ND
Dichloroprop	NA	6.7	52.2	5.1	39
MCPA	NA	3300	2800	2400	1350
MCPP	NA	ND	ND	ND	ND
Pentachlorophenol	9600	2.2	7.7	2.2	4.3
Metals (mg/kg)					
Aluminum, Total	NA	52	40	100	50
Antimony	NA	ND	ND	ND	ND
Arsenic, Total	0.52	ND	ND	ND	ND
Barium, Total	NA	ND	ND	ND	ND
Cadmium, Total	0.5	ND	ND	ND	ND
Chromium, Total	NA	0.3	0.3	1.7	0.71
Copper, Total	12.1	2	1	0.75	0.54
Iron	NA	ND	ND	ND	ND
Lead, Total	26.2	0.59	0.36	0.4	0.3
Manganese	NA	ND	ND	ND	ND
Mercury	0.25	0.6	0.2	0.064	0.053
Molybdenum	NA	ND	ND	ND	ND
Nickel, Total	NA	ND	ND	ND	ND
Selenium	1.6	0.54	0.44	0.65	0.42
Silver	NA	ND	ND	ND	ND
Zinc, Total	NA	33	30	33	26
Total PCBs (ug/kg)	950	39	30	ND	ND
Pesticides (ug/kg)					
4,4'-DDD	600	ND	ND	ND	ND
4,4'-DDE	29200	10	7.7	3.5	4.9
4,4'-DDT	3800	ND	ND	ND	ND
Aldrin	157	ND	ND	ND	ND
Alpha Chlordane	16600 a	ND	ND	ND	ND
delta-BHC	NA	ND	ND	ND	ND
Dieldrin	3700	ND	ND	4.7	5.4
Endosulfan I	195 b	ND	ND	ND	ND
Endosulfan II	195 b	ND	ND	ND	ND
Endosulfan sulfate	NA	ND	ND	ND	ND
Endrin aldehyde	150 c	ND	ND	ND	ND
Endrin ketone	150 c	ND	ND	ND	ND
Gamma Chlordane	16600 a	ND	ND	1.2	3.2
gamma-BHC (Lindane)	NA	ND	ND	ND	ND
Heptachlor	5700	ND	ND	ND	ND
Heptachlor epoxide	3200	ND	ND	ND	ND
Methoxychlor	128	ND	ND	ND	ND
SVOC (ug/kg)					
bis(2-ethylhexyl)phthalate	NA	230	183	280	172
Di-n-butylphthalate	NA	ND	ND	ND	ND
Diethylphthalate	NA	37	31	37	61.3
Acenaphthylene	NA	ND	ND	ND	ND
Fluoranthene	NA	ND	ND	ND	ND
Benzo(b)fluoranthene	NA	ND	ND	ND	ND
Benzo(k)fluoranthene	NA	ND	ND	ND	ND
Benzo(a)pyrene	23.9	ND	ND	ND	ND
Benzo(g,h,i)perylene	NA	ND	ND	ND	ND
Indeno(1,2,3-c-d)pyrene	NA	54	103	ND	ND
Dibenz(a,h)anthracene	NA	48	101	ND	ND
2,3,7,8-TCDD, TEQ, ug/kg	0.05	0.001 *	0.00085 *	0.0014	0.00096

* Maximum and Average TEQs for fish was used for comparison to benchmark
a Benchmark value is for Chlordane
b Benchmark value for Endosulfan was used
c Benchmark values for Endrin were used

Table 7-4
Whole Body Toxicity Values for Fish
Sauget Area 1

Compound	Species Common Name	Chemical Common Name	Concentration -Wet (mg/kg)	Reps	Effect	Endpoint	Exposure Route	Body Part	Start Life Stage
Herbicides									
Pentachlorophenol	Fathead minnow	PCP	22.1	1	Growth	LOED	Combined	Whole Body	Embryo
	Fathead minnow	PCP	12.6	1	Growth	NOED	Combined	Whole Body	Embryo
	Largemouth Bass	PCP	***9.6***	5	Growth	LOED	Absorption	Whole Body	Immature
	Trout - Rainbow	PCP	13.8	4	Mortality	ED100	Absorption	Whole Body	Adult
Metals									
Arsenic	Bluegill	Arsenic	0.52	5	Mortality	NOED	Absorption	Whole Body	Immature
Cadmium	Guppy	Cadmium	0.5	2	Growth	LOED	Ingestion	Whole Body	Immature
Copper	Common carp	Copper	12.1	1	Morphology; Mortality	LOED	Combined	Whole Body	Egg
	Common carp	Copper	12.1	1	Reproduction	NOED	Combined	Whole Body	Egg
Lead	Fathead minnow	Lead	26.2	1	Behavior	LOED	Absorption	Whole Body	Immature
	Fathead minnow	Lead	26.2	1	Behavior, Physiological	NOED	Absorption	Whole Body	Immature
Mercury	Walleye	Mercury	0.25	22	Cellular, Developmental, Physiological	LOED	Ingestion	Whole Body	Immature
	Walleye	Mercury	0.25	22	Mortality	NOED	Ingestion	Whole Body	Immature
Selenium	Bluegill	Selenium	4.6	6	Mortality	LOED	Combined	Whole Body	Adult
	Fathead minnow	Selenium	12.2	3	Growth	LOED	Ingestion	Whole Body	Larval
	Fathead minnow	Selenium	10.3	3	Growth	NOED	Ingestion	Whole Body	Larval
	Bluegill	Selenium	***1.6***	5	Cellular	LOED	Combined	Whole Body	Immature
	Bluegill	Selenium	4.3	3	Mortality	NOED	Absorption	Whole Body	Immature
	Largemouth Bass	Selenium	3	3	Mortality	NOED	Absorption	Whole Body	Immature
PCBs and Pesticides									
PCBs									
	Catfish-Channel	PCBs	14.3	3	Growth, Morphology	LOED	Ingestion	Whole Body	Immature
	Pinfish	PCBs	2.2	2	Mortality	LOED	Absorption	Whole Body	Immature
	Pinfish	PCBs	0.98	10	Mortality	NOED	Absorption	Whole Body	Immature
	Pinfish	PCBs	3.8	10	Mortality	NOED	Absorption	Whole Body	Immature
	Catfish-Channel	PCBs	10.9	3	Mortality	NOED	Ingestion	Whole Body	Immature
	Catfish-Channel	PCBs	14.3	3	Mortality	NOED	Ingestion	Whole Body	Immature
	Redbreast sunfish	PCBs	***0.95***	field study	Reproduction; Growth	NOED	Field study	Whole Body	Adult
	Redbreast sunfish	PCBs	***0.95***	field study	Reproduction; Growth	NOED	Field study	Whole Body	Adult
	Redbreast sunfish	PCBs	***0.95***	field study	Reproduction; Growth	NOED	Field study	Whole Body	Adult

Table 7-4
Whole Body Toxicity Values for Fish
Sauget Area 1

Compound	Species Common Name	Chemical Common Name	Concentration -Wet (mg/kg)	Reps	Effect	Endpoint	Exposure Route	Body Part	Start Life Stage
DDD	Fathead minnow	4,4'-DDD	0.6	1	Reproduction	LOED	Combined	Whole Body	Adult
DDE	Mosquito fish	4,4'-DDE	29.2	1	Mortality	NOED	Combined	Whole Body	NA
DDT	Fathead minnow	4,4'-DDT	3.8	1	Reproduction	LOED	Combined	Whole Body	Adult
Aldrin	Mosquito fish	Aldrin	0.157	1	Mortality	NOED	Combined	Whole Body	NA
Dieldrin	Bluegill	Dieldrin	3.7	5	Behavior	LOED	Absorption	Whole Body	Immature
Endosulfan	Pinfish	Endosulfan	0.195	1	Mortality	NOED	Combined	Whole Body	Mature
Endrin	Golden Shiner	Endrin	***0.15***	3	Behavior	LOED	Absorption	Whole Body	NA
	Mosquito fish	Endrin	3.4	1	Mortality	LOED	Combined	Whole Body	NA
	Catfish-Channel	Endrin	0.41	1	Mortality	NOED	Absorption	Whole Body	Immature
Chlordane	Pinfish	Chlordane	16.6	2	Mortality	LOED	Combined	Whole Body	Adult
Heptachlor	Pinfish	Heptachlor	5.7	1	Mortality	NOED	Combined	Whole Body	Mature
Heptachlor epoxide	Pinfish	Heptachlor epoxide	3.2	1	Mortality	NOED	Combined	Whole Body	Mature
Methoxychlor	Mosquito fish	Methoxychlor	0.128	1	Mortality	NOED	Combined	Whole Body	NA
SVOCs									
Benzo(a)pyrene	Gizzard Shad	Benzo[a]pyrene	0.0283	2	Physiological	LOED	Absorption	Whole Body	Adult
	Gizzard Shad	Benzo[a]pyrene	***0.0239***	2	Physiological	NOED	Absorption	Whole Body	Adult
Dioxin	Common carp	2,3,7,8-TCDD	0.0022	1	Behavior, Cellular, Morphology, mortality	LOED	Absorption	Whole Body	Adult
	Yellow perch	2,3,7,8-TCDD	0.000143	6	Growth, Morphology, Mortality	NOED	Ingestion	Whole Body	Immature
	Lake trout	2,3,7,8-TCDD	***0.00005***	NA	Mortality	NOED	Absorption	Whole Body	Based on egg concentration

If multiple values are available, selected value is bold and in italics.

Table ·-4
Whole Body Toxicity Values for Fish
Sauget Area 1

Compound	Year	Author	Journal
Herbicides			
Pentachlorophenol	1985	Spehar, R.L., Nelson,H.P., Swanson, M.J., Renoos, J.W.	Environmental Toxicology and Chemistry, Vol. 4, pp 389-397, 1985
	1985	Spehar, R.L., Nelson,H.P., Swanson, M.J., Renoos, J.W.	Environmental Toxicology and Chemistry, Vol. 4, pp 389-397, 1985
	1985	Mathers, R.A., J.A. Brown and P.H. Johansen	Aquat. Toxicol. 6:157-164.
	1991	Mckim, J.M. and P.K. Schmieder	p. 161-188 in Nagel, R.et.al. Bioacc. in Aquatic Systems, Contrib. to Assmt. Proceedings
Metals			
Arsenic	1980	Barrows, M.E., S.R. Petrocelli, K.J. Macek and J.J. Carroll	p. 379-392 in Haque, R., ed. Dynamics, Exposure and Hazard Assessment of Toxic Chemicals
Cadmium	1982	Hatakeyama, S. and M. Yasuno	Bull. Environ. Contam. Toxicol. 29:159-166.
Copper	1996	Stouthart, J.H.X., Haans, J.L.M., Lock, R.A.C., Bonga, S.E.W.	Environmental Toxicology and Chemistry, Vol. 15, No. 3, pp. 376-383 (1996)
	1996	Stouthart, J.H.X., Haans, J.L.M., Lock, R.A.C., Bonga, S.E.W.	Environmental Toxicology and Chemistry, Vol. 15, No. 3, pp. 376-383 (1996)
Lead	1991	Weber, D.N., Russo, A., Seale, D.B., Spieler, R.E.	Aquatic Toxicol. 21: 71-80
	1991	Weber, D.N., Russo, A., Seale, D.B., Spieler, R.E.	Aquatic Toxicol. 21: 71-80
Mercury	1996	Friedmann, A.S., M.C. Watzin, T. Brinck-Johnsen and J.C. Leiter	Aquat. Toxicol. 35:265-278.
	1996	Friedmann, A.S., M.C. Watzin, T. Brinck-Johnsen and J.C. Leiter	Aquat. Toxicol. 35:265-278.
Selenium	1992	Hermanutz, R.O., Allen, K.N., Roush, T.H., and S.F. Hedtke	Environ. Tox. Chem. 11: 217-224
	1986	Bennett, W.N., A.S. Brooks and M.E. Boraas	Arch. Environ. Contam. Toxicol. 15:513-517.
	1986	Bennett, W.N., A.S. Brooks and M.E. Boraas	Arch. Environ. Contam. Toxicol. 15:513-517.
	1993	Lemly, A.D.	Aquat. Toxicol. 27:133-158.
	1982	Lemly, A.D.	Aquat. Toxicol. 2:235-252.
	1982	Lemly, A.D.	Aquat. Toxicol. 2:235-252.
PCBs and Pesticides			
PCBs			
	1976	Hansen, L.G., W.B. Wiekhorst and J. Simon	J. Fish. Res. Bd. Can. 33:1343-1352.
	1974	Hansen, D.J., P.R. Parrish and J. Forester	Environ. Res. 7:363-373.
	1970	Duke, T.W., J.I. Lowe and A.J. Wilson, Jr.	Bull. Environ. Contam. Toxicol. 5:171-180.
	1970	Duke, T.W., J.I. Lowe and A.J. Wilson, Jr.	Bull. Environ. Contam. Toxicol. 5:171-180.
	1976	Hansen, L.G., W.B. Wiekhorst and J. Simon	J. Fish. Res. Bd. Can. 33:1343-1352.
	1976	Hansen, L.G., W.B. Wiekhorst and J. Simon	J. Fish. Res. Bd. Can. 33:1343-1352.
	1989	Adams, S.M., K.L. Shepard, M.S. Greeley Jr., B.D. Jimenez, M.G. Ryon, L.R. Ghugart, and J.F. McCarthy;	Marine Envirnmental Research. 28: 459-464.
	1990	Adams, S.M., L.R. Shugart, G.R. Southworth and D.E. Hinton	In J.F. McCarthy and L.R. Shugart, eds., Biomarkers of Environmental Contamination. Lewis Publishers, Boca Raton, FL., pp. 333-353.
	1992	Adams, S.M., W.D. Crumby, M.S. Greeley, Jr., M.G. Ryon, and E.M Schilling	Environmental Toxicology and Chemistry. 11: 1549-1557.

Table 7-4
Whole Body Toxicity Values for Fish
Sauget Area 1

Compound	Year	Author	Journal
DDD	1977	Jarvinen, A W , M J Hoffman, and T W Thorslund	J Fish Res Board Can 34 2089-2103
DDE	1974	Metcalf, R L	p 17-38 in Hayes, W J , Essays in Toxicology, Volume 5 Academic Press
DDT	1977	Jarvinen, A W , M J Hoffman, and T W Thorslund	J Fish Res Board Can 34 2089-2103
Aldrin	1974	Metcalf, R L	p. 17-38 in Hayes, W J., Essays in Toxicology, Volume 5 Academic Press
Dieldrin	1967	Gakstatter, J.H and C M. Weiss	Trans Amer Fish Soc 96 301-307
Endosulfan	1977	Schimmel, S C , Patrick, J M , Wilson, A J	Aquatic Toxicology and Hazard Evaluation, ASTM STP 634, American Society for Testing and Materials, pp 241-252 (1977)
Endrin	1968	Ludke, J L , D E Ferguson and W D Burke	Trans Amer Fish Soc 97 260-263
	1973	Metcalf, R.L , I P Kapoor, P Y Lu, C K Schuth and P Sherman	Environ Health Perspect 8 35-44
	1973	Argyle, R L , Williams, G C , and H K Dupree	J Fish Res Board Can 30 1743-1744
Chlordane	1976	Parrish, P R , S C Schimmel, D J Hansen, J M Patrick, and J Forester	Journal of Toxicology and Environmental Health, 1 485-494, 1976
Heptachlor	1976	Schimmel, S C , Patrick, J M , Forester, J.	Journal of Toxicology and Environmental Health, 1 955-965, 1976
Heptachlor epoxide	1976	Schimmel, S C , Patrick, J M , Forester, J.	Journal of Toxicology and Environmental Health, 1 955-965, 1976
Methoxychlor	1974	Metcalf, R L	p. 17-38 in Hayes, W J , Essays in Toxicology, Volume 5 Academic Press
SVOCs			
Benzo(a)pyrene	1994	Levine, S L , J T Oris and T E Wissing	Aquat Toxicol 30 61-75.
	1994	Levine, S.L., J.T. Oris and T.E. Wissing	Aquat. Toxicol. 30 61-75.
Dioxin	1991	Cook, P.M., D.W. Kuehl, M.K. Walker and R.E. Peterson	p. 143-167 in Gallow, M.A., et.al. Biol. Basis for Risk Assmt. of Dioxins and Related Compounds.
	1986	Kleeman, J.M., J.R. Olson, S.M. Chen and R.E. Peterson	Toxicol. Appl. Pharmacol. 83:402-411.
	1993	USEPA	EPA/600/R-93/055

If multiple values are available, selected value is bold and in italics.

Table 7-5
Comparison of Dead Creek Segment F Surface Water Concentrations to Criteria
Sauget Area I

Sample ID: Compounds[6]	SW-CSF-S1 Concentration	ER Q	SW-CSF-S2 Concentration	ER Q	SW-CSF-S3 Concentration	ER Q	Water Quality Benchmark Acute		Chronic	
Total Metals (mg/l) - non-filtered										
Aluminum	0.039	J	**0.15**	J	**0.55**		0.75	2,c	0.087	2,c
Arsenic	0.01	U	0.0032	J	0.0049	J	0.36	1	0.19	1
Barium	**0.13**		**0.13**		**0.12**		0.11	3	0.004	3
Copper	0.0016	J	0.002	J	0.012	J	0.044	1,a	0.027	1,a
Iron	0.5		0.55		1				1	2
Lead	0.005	U	0.0022	J	0.0037	J	0.33	1,a	0.069	1,a
Manganese	0.082	J	0.1	J	**0.14**	J	2.3	3	0.12	3
Molybdenum	0.01	U	0.01	U	0.0028	J	16	3	0.37	3
Nickel	0.0069	J	0.013	J	0.021	J	1.1	2,b	0.12	2,b
Zinc	0.0073	J	0.035		0.075		0.27	2,b	0.27	2,b
SVOC (ug/l)										
Fluoranthene	0.7	J	10	U	10	U			15	4
Dioxins (ug/l)										
2,3,7,8-TCDD TEQ Mammal [5]	9.01197E-06		1.5012E-06		1.5583E-06					

[1] Illinois Water Quality Standards

[2] US Environmental Protection Agency. 1999. National Recommended Water Quality Criteria—Correction. Office of Water, Washington, DC. April 1999. EPA 822-Z-99-001

[3] Suter, GW, CL Tsao. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Prepared for U.S Department of Energy. Oak Ridge National Laboratory. June 1996. ES/ER/TM-96/R2.

[4] Suter, GW, CL Tsao. 1996 Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Prepared for U.S. Department of Energy. Oak Ridge National Laboratory. June 1996. ES/ER/TM-96/R2

[5] Fish TEQ values were calculated for 2,3,7,8-TCDD

[6] Other COPCs were not detected in Dead Creek Sector F surface water

bolded values indicate exceedance of chronic Water Quality Benchmarks
shaded values indicate exceedance of acute Water Quality Benchmarks

"a" Calculated values for Illinois criteria are based on average hardness
"b" NAWQ Criteria for metals are calculated based on hardness
"c" At pH 6.5 - 9.0, see G, I, and L under National recommended water quality criteria for non priority pollutants

Hardness dependent criteria calculated at an average hardness for Creek Section F of 263 mg/l as $CaCO_3$.

Table 7-6
Comparison of Borrow Pit Surface Water Concentrations to Criteria
Sauget Area I

Sample ID:	SW-BPL-S1 Concentration	ER Q	SW-BPL-S2 Concentration	ER Q	SW-BPL-S3 Concentration	ER Q	Water Quality Benchmark Acute		Chronic	
Compounds										
Total Metals (mg/l) non-filtered										
Aluminum	**3.4**		**0.71**		**0.65**		0.75	2,d	0.087	2,d
Arsenic	0 015		0.0079	J	0.012		0 36	1	0.19	1
Barium	**0.32**		**0.12**		**0.045**		0.11	3	0 004	3
Chromium	0.0041	J	0.01	U	0.01	U	4.036/.016	1,a	0.481/.011	1,a
Copper	0.0074	J	0.0036	J	0.0048	J	0.0468	1,a	0.0285	1,a
Iron	**8.7**	J	**1.6**	J	**1.3**	J			1	2
Lead	0.02		0.002	J	0.0029	J	0.355	1,a	0.0744	1,a
Manganese	**1.7**		**0.13**		**0.17**		2.3	3	0.12	3
Molybdenum	0.0035	J	0.01	U	0.004	J	16	3	0 37	3
Nickel	0.015	J	0.012	J	0.0077	J	1.1	2,b	0 12	2,b
Zinc	0.048		0.027		0.017	J	0.287	2,b	0.287	2,b
Pesticides (ug/l)										
delta-BHC	0.00013	J	0.0022	J	0.012	U	39	3,g	2.2	3,g
Dieldrin	0.1	U	0.1	U	0.001	J	0.24	2	0.056	2
Endosulfan I	0.0024	J	0.05	U	0.0015	J	0 22	2,e	0.056	2,e
Endosulfan sulfate	0.1	U	0.1	U	0.0032	J	0.22	2,e	0.056	2,e
Endrin	0.1	U	0.1	U	0.00095	J	0.086	2,c	0.036	2,c
Endrin aldehyde	0.0032	J	0.1	U	0.0016	J	0.086	2,c	0.036	2,c
Endrin ketone	0.1	U	0.1	U	0.0027	J	0.086	2,c	0.036	2,c
gamma-BHC (Lindane)	0.019	U	0.0038	J	0.0024	J	0.95	2	0.036	2,c
Heptachlor	0.0026	J	0.0022	J	0.0029	J	0.52	2	0.0038	2
Heptachlor epoxide	0.00096	J	0 0009	J	0.05	U	0.52	2	0.0038	2
Dioxins (ug/l)										
2,3,7,8-TCDD TEQ Mammal [h]	8.5902E-07		7.453E-07		4.8413E-07					

[1] Illinois Water Quality Standards
[2] US Environmental Protection Agency. 1999. National Recommended Water Quality Criteria—Correction. Office of Water, Washington, DC. April 1999. EPA 822-Z-99-001.
[3] Suter, GW, CL Tsao. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Prepared for U.S. Department of Energy. Oak Ridge National Laboratory. June 1996. ES/ER/TM-96/R2.

Only those COPCs detected in the Borrow Pit are shown
bolded values indicate exceedance of chronic Water Quality Benchmarks
shaded values indicate exceedance of acute Water Quality Benchmarks

"a" Calculated values for Illinois criteria are based on average hardness
"b" NAWQ Criteria for metals are calculated based on hardness
"c" there is some uncertainty since the detection limit is greater than the AWQC
"d"At pH 6.5 - 9.0, see G, I, and L under National recommended water quality criteria for non priority pollutants
"e" For alpha- and beta-Endosulfan
"f" For PCBs
"g" For BHC (other)
"h" Mammal TEQ values were calculated for 2,3,7,8-TCDD
Hardness dependent criteria calculated at an average hardness for the Borrow Pit Lake of 280 mg/l as $CaCO_3$

Table 7-7a
Comparison of Sediment Concentrations in Dead Creek Section F to Ecological Sediment Quality Guidelines
Sauget Area I

Sample ID: Compounds	SED-CSF-S1-0 2FT Concentration	ER Q	SED-CSF-S2-0 2FT Concentration	ER Q	SED-CSF-S3-0 2FT Concentration	ER Q	Sediment Quality Guidelines[1] Consensus-based TEC	Sediment Quality Guidelines [1] Consensus-based PEC
Herbicides (ug/kg)								
2,4-D	110	UJ	240	UJ	23	J	NA	NA
Metals (mg/kg)								
Aluminum	7800	J	14000	J	17000	J	NA	NA
Arsenic	8	J	**19**	J	**15**	J	9 79	33
Barium	150	J	250	J	270	J	NA	NA
Beryllium	0.53	J	0.85	J	0.89	J	NA	NA
Cadmium	**7.4**	J	**47**	J	**14**	J	0.99	4 98
Chromium	19	J	38	J	30	J	43.4	111
Copper	**160**	J	**410**	J	**240**	J	31.6	149
Iron	14000	J	**22000**	J	**26000**	J	20000 [2]	40000 [2]
Lead	**110**	J	**320**	J	**110**	J	35 8	128
Manganese	170	J	230	J	**510**	J	460 [2]	1100 [2]
Mercury	**0.3**	J	**1.1**	J	**0.45**	J	0.18	1.06
Molybdenum	0.7	J	3 7	J	0 76	J	NA	
Nickel	**90**	J	**390**	J	**180**	J	22.7	48 6
Zinc	**950**	J	**3700**	J	**1600**	J	121	459
PCBs and Pesticides (ug/kg)								
Total PCBs	**83**	J	**83**	J	120	UJ	59.8	676
4,4'-DDT	**4.5**	J	35	UJ	24	UJ	4.16 [3]	62 9 [3]
Total DDT	**19**	J	**43**	J	**27**	J	5.28	572
Aldrin	**4.1**	J	18	UJ	12	UJ	2 [2]	320, 1120, 488 [2,5]
Alpha Chlordane	**4.6**	J	**5.3**	J	0.84	J	3.24 [4]	17.6 [4]
delta-BHC	0.34	J	5.3	UJ	3.7	UJ	NA	NA
Dieldrin	**9.3**	J	35	UJ	0 99	J	1 9	61.8
Endosulfan I	5 7	J	2	J	1 2	J	NA	NA
Endosulfan II	8.1	J	5.5	J	1 8	J	NA	NA
Endosulfan sulfate	2 8	J	35	UJ	24	UJ	NA	NA
Endrin	1 7	J	35	UJ	1.7	J	2.22	207
Endrin aldehyde	14	J	9	J	3 6	J	NA	NA
Endrin ketone	10	J	7 2	J	3.8	J	NA	NA
Gamma Chlordane	**17**	J	**7.5**	J	2.4	J	3 24 [4]	17 6 [4]
Heptachlor	7 8	UJ	18	UJ	**0.93**	J	0 3 NEL [2]	NA
Heptachlor epoxide	**5.4**	J	18	UJ	0 51	J	2.47	16
Methoxychlor	24	J	14	J	7 3	J	NA	NA
SVOC (ug/kg)								
Fluoranthene	120	J	**890**	UJ	130	J	423	2230
Dioxins (ug/kg)								
2,3,7,8-TCDD TEQ Mammal [6]	0.144391		0.3318165		0.170232		NA	NA

NA indicates not available.

[1] MacDonald, D.D., C G. Ingersoll, and T A Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems *Arch Environ*

[2] Persaud, D., R. Jaagumagi, and A. Hayton. 1993 Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of Environment and Energ

[3] Guidelines for sum DDT
[4] Guidelines for Chlordane
[5] Ontario SEL value is site specific based on TOC value
[6] Mammal TEQ values were calculated for 2,3,7,8-TCDD
bolded numbers exceed TEC value, or Ontario LEL or NEL value
shaded numbers exceed PEC value

Table 7-7b
Comparison of Industry Specific Sediment Concentrations in Dead Creek Sector F to Sediment Quality Guidelines
Sauget Area I

SAMPLE ID: Compounds	Sediment Quality Guidelines[1] Consensus-based TEC	Sediment Quality Guidelines[1] Consensus-based PEC	FASED-CSF-S1E-0-8IN Concentration	ER Q	FASED CSF S2 0-7IN Concentration	ER Q	FASED CSF-S3E-0-6IN Concentration	ER Q	FASED-CSF-S4 0-7IN Concentration	ER Q	FASED-CSF-S5W-0-10IN Concentration	ER Q	FASED-CSF-S6E-0-10IN Concentration	ER Q	FASED-CSF-S7E-0-11IN Concentration	ER Q
Copper (mg/kg dw)	31 6	149	17		12		17		10		13		17		21	
Zinc (mg/kg dw)	121	459	88		53		63		50		62		85		84	
Total PCBs (ug/kg)	59 8	676	25	U	**1109.5**		22	U	22	U	52 95		24	U	23	U

[1] MacDonald, D D , C G Ingersoll, and T A Berger. 2000
Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems *Arch. Environ*
Bolded numbers exceed TEC value or Ontario LEL value
Shaded numbers exceed PEC value

Table 7-7b
Comparison of Industry Specific Sediment Concentrations In Dead Creek Sector F to Sediment Quality Guidelines
Sauget Area I

SAMPLE ID: Compounds	Sediment Quality Guidelines[1] Consensus-based TEC	Sediment Quality Guidelines[1] Consensus-based PEC	FASED CSF S8 0-15IN Concentration	ER Q	FASED CSF S9 0-11IN Concentration	ER Q	FASED CSF S13W-0-15IN Concentration	ER Q	FASED CSF S12-0-15INFD Concentration	ER Q	FASED CSF S11W-0-10IN Concentration	ER Q	FASED CSF S14W-0-15IN Concentration	ER Q	FASED-CSF-S10-0-9IN Concentration	ER Q	FASED-CSF-S15W-0-28IN Concentration	ER Q	FASED-CSF-S16-0-23IN Concentration	ER Q
Copper (mg/kg dw)	31 6	149	**34**		**78**		**370**		**76**		**88**		**460**		**33**		**430**		**33**	
Zinc (mg/kg dw)	121	459	**160**		**400**		**2100**		**685**		**690**		**3200**		**250**		**7700**		**3900**	
Total PCBs (ug/kg)	59 8	676	24	U	29	U	**290**		28	U	29	U	**457.35**		25	U	**704.5**		**75.95**	

[1] MacDonald, D D., C G Ingersoll, and T A Berger 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems *Arch Environ*
Bolded numbers exceed TEC value or Ontario LEL value
Shaded numbers exceed PEC value

Table 7-7b
Comparison of Industry Specific Sediment Concentrations In Dead Creek Sector F to Sediment Quality Guidelines
Saugct Area I

SAMPLE ID: Compounds	Sediment Quality Guidelines[1] Consensus-based TEC	Sediment Quality Guidelines[1] Consensus-based PEC	FASED CSF S17W-0-16IN Concentration	ER Q	FASED-CSF-S18E-0-14IN Concentration	ER Q	FASED-CSF-S19-0-13IN Concentration	ER Q	FASED-CSF-S20-0-12IN Concentration	ER Q	FASED-CSF-S21-0-13INFD Concentration	ER Q	FASED-CSF-S22E-0-20IN Concentration	ER Q	FASED-CSF-S23-0-15IN Concentration	ER Q	FASED-CSF-S24W-0-13IN Concentration	ER Q	FASED-CSF-S25E-0-10IN Concentration	ER Q
Copper (mg/kg dw)	31 6	149	**1400**		**1700**		**5400**		**710**		**1060**		**420**		**1400**		**530**		**2500**	
Zinc (mg/kg dw)	121	459	**11000**		**9100**		**10000**		**2300**		**4450**		**4800**		**5400**		**3200**		**6200**	
Total PCBs (ug/kg)	59 8	676	**484.05**		**289.6**		**1249.4**		**486.8**		**663.15**		**1101.2**		**1403.5**		**244.75**		**1049.6**	

[1] MacDonald, D D , C G Ingersoll, and T.A Berger 2000
Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems *Arch. Environ.*
Bolded numbers exceed TEC value or Ontario LEL value
Shaded numbers exceed PEC value

Table 7-7b
Comparison of Industry Specific Sediment Concentrations In Dead Creek Sector F to Sediment Quality Guidelines
Sauget Area I

SAMPLE ID: **Compounds**	**Sediment Quality Guidelines[1] Consensus-based TEC**	**Sediment Quality Guidelines[1] Consensus-based PEC**	FASED CSF S26W-0-13IN **Concentration**	**ER Q**	FASED CSF S27E-0-16IN **Concentration**	**ER Q**	FASED-CSF-S28-0-10IN **Concentration**	**ER Q**	FASED-CSF-S29W-0-10IN **Concentration**	**ER Q**
Copper (mg/kg dw)	31 6	149	**1930**		**1900**		**1200**		26	
Zinc (mg/kg dw)	121	459	**4700**		**8200**		**3200**		**510**	
Total PCBs (ug/kg)	59 8	676	**581.2**		**1811**		**6470.5**		24	UJ

[1] MacDonald, D D., C G Ingersoll, and T A Berger 2000.
Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems *Arch. Environ*
Bolded numbers exceed TEC value or Ontario LEL value
Shaded numbers exceed PEC value

Table 7-8a
Comparison of Ecological Borrow Pit Lake Sediment Concentrations to Sediment Quality Guidelines
Sauget Area I

Sample ID / **Compounds**	BPL-ESED-S1-0 2FT Average **Concentration**	**ER Q**	BPL-ESED-S2-0 2FT **Concentration**	**ER Q**	BPL-ESED-S3-0 2FT **Concentration**	**ER Q**	**Sediment Quality Guidelines [1] Consensus-based TEC**	**Sediment Quality Guidelines [1] Consensus-based PEC**
Herbicides (ug/kg)								
2 4-D	8 8	J	24	UJ	11	J	NA	NA
Metals (mg/kg)								
Aluminum	14000	J	16000	J	11000	J	NA	NA
Arsenic	**17**	J	**17**	J	**13**	J	9 79	33
Barium	390	J	420	J	240	J	NA	NA
Beryllium	0.74	J	0 82	J	0 58	J	NA	NA
Cadmium	**2**	J	**2.7**	J	**1.6**	J	0 99	4 98
Chromium	21	J	26	J	18	J	43 4	111
Copper	46	U	**64**	J	**36**	J	31 6	149
Iron	36000	U	**38000**	J	**28000**	J	20000 [2]	40000 [2]
Lead	52	U	**58**	J	34	J	35 8	128
Manganese	**1300**	J	**1400**	J	**940**	J	460 [2]	1100 [2]
Mercury	0 1	U	0 16	J	0 11	J	0 18	1 06
Molybdenum	0 5	U	0.92	J	0 37	J		
Nickel	53	U	**54**	J	**35**	J	22 7	48 6
Silver	2.8	UJ	0 79	J	2 5	UJ		
Zinc	**310**	J	**370**	J	**250**	J	121	459
Pesticides (ug/kg)								
4,4'-DDE	1.1	J	**3.2**	J	1 6	J	3 16 [3]	31 3 [3]
4,4'-DDT	1 1	J	19	UJ	1.4	J	4.16 [3]	62 9 [3]
Total DDT	2 2	J	**22**	J	3	J	5 28	572
Alpha Chlordane	0 48	J	3 2	J	1 2	J	3 24 [4]	17 6 [4]
Dieldrin	0 26	J	0 5	J	18	UJ	1 9	61 8
Endosulfan I	4.9	J	2 8	J	1	J		
Endosulfan sulfate	9 5	J	1.4	J	18	UJ		
Endrin aldehyde	1 4	J	2 2	J	1 2	J		
Endrin ketone	0 72	J	19	UJ	18	UJ		
Gamma Chlordane	0 74	J	3	J	9 4	UJ	3 24 [4]	17 6 [4]
gamma-BHC (Lindane)	**4.8**	J	9 9	UJ	9 4	UJ	2 37	4 99
Heptachlor epoxide	**4.8**	J	9 9	UJ	9 4	UJ	2 47	16
Dioxins (ug/kg)								
2,3,7,8-TCDD TEQ Mammal [5]	0 0134195				0 0194186			

[1] MacDonald, D D , C G Ingersoll, and T A Berger 2000 Development and Evaluation of Consensus Based Sediment Quality Guidelines for Freshwater Ecosystems Arch Environ Contamin Toxicol 39 20-31

[2] Persaud, D , R Jaagumagi, and A Hayton 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario Ontario Ministry of Environment and Energy August, 1993

[3] Guidelines for sum DDT
[4] Guidelines for Chlordane
[5] Mammal TEQ values were calculated for 2,3,7,8-TCDD
bolded numbers exceed TEC value or Ontario LEL value
shaded numbers exceed PEC value

Table 7-8b
Comparison of Industry Specific Borrow Pit Lake Sediment Concentrations to Sediment Quality Guidelines
Sauget Area I

Sample ID: **Compounds**	**Sediment Quality Guidelines[1] Consensus-based TEC**	**Sediment Quality Guidelines [1] Consensus-based PEC**	FASED-BPL-S1-0-10IN **Concentration**	**ER Q**	FASED-BPL-S2-0-10IN **Concentration**	**ER Q**	FASED-BPL-S3-0-8IN **Concentration**	**ER Q**	FASED-BPL-S4-0-10IN **Concentration**	**ER Q**	FASED-BPL-S5-0-9IN **Concentration**	**ER Q**	FASED-BPL-S6-0-11IN DUP avgd. **Concentration**	**ER Q**
Copper (mg/kg dw)	31.6	149	9.9		15		14		13		13		17	
Zinc (mg/kg dw)	121	459	**380**		**230**		**300**		**360**		**280**		**335**	

[1] MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000.
Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems. Arch. Environ.
Bolded numbers exceed TEC value or Ontario LEL value
Shaded numbers exceed PEC value
Only compounds detected at least once in this medium in this area are shown on this table.

Table 7-8b
Comparison of Industry Specific Borrow Pit Lake Sediment Concentrations to Sediment Quality Guidelines
Sauget Area I

Sample ID: **Compounds**	**Sediment Quality Guidelines[1] Consensus-based TEC**	**Sediment Quality Guidelines [1] Consensus-based PEC**	FASED-BPL-S7-0-9IN **Concentration**	**ER Q**	FASED-BPL-S8-0-9IN **Concentration**	**ER Q**
Copper (mg/kg dw)	31 6	149	18		21	
Zinc (mg/kg dw)	121	459	**410**		**490**	

[1] MacDonald, D D., C.G. Ingersoll, and T.A. Berger. 2000.
Development and Evaluation of Consensus-Based Sediment
Quality Guidelines for Freshwater Ecosystems. Arch. Environ.
Bolded numbers exceed TEC value or Ontario LEL value
Shaded numbers exceed PEC value
Only compounds detected at least once in this medium in this area

Table 7-9
Number of Taxa, Number of Organisms, and Three Dominant Taxa in Dead Creek Section F and Borrow Pit Lake Samples
Sauget Area I

Location	Station	Number of Organisms	Number of Taxa	Dominant Taxon*	2nd Dominant Taxon	3rd Dominant Taxon	Total Organic Carbon, percent
Dead Creek Section F	F-1	156	16	Chironomidae	Sphaeriidae	Chironomidae	4.0
	F-2	154	11	Ceratopogonidae	Oligochaeta	Ceratopopogonidae	14
	F-3	358	17	Oligochaeta	Oligochaeta	Chironomidae	6.1
Borrow Pit Lake	BP-1	126	18	Oligochaeta	Odonata	Oligochaeta	6.7
	BP-2	262	17	Oligochaeta	Oligochaeta	Ceratopogonidae	4.5
	BP-3	151	14	Oligochaeta	Oligochaeta	Oligochaeta	3.3
Prairie du Pond Creek (Reference Area 1)	PDC-1	92	8	Oligochaeta	Ceratopogonidae	Oligochaeta	1.2
	PDC-2	148	9	Oligochaeta	Chaoboridae	Oligochaeta	2.3
Reference Area 2	REF2-1	4420	16	Oligochaeta	Ceratopogonidae	Chironomidae	1.3
	REF2-2	87	13	Oligochaeta	Ceratopogonidae	Chironomidae	2.0

*Dominant taxa were calculated at the genus or species level but expressed as higher taxa.

Table 7-10

Diversity Indices for Dead Creek Section F, the Borrow Pit Lake, and Reference Areas

Sauget Area I

Summation of Replicates	H' (Shannon-Weaver Index (natural log))[a]	Relative H' (H'/H'max)[b]	λ (Simpson's Index)[c]
F-1	2.28	0.82	0.14
F-2	1.66	0.69	0.25
F-3	1.60	0.56	0.31
BP-1	2.53	0.87	0.11
BP-2	2.09	0.74	0.23
BP-3	1.56	0.59	0.35
PDC-1	0.66	0.32	0.74
PDC-2	0.58	0.26	0.79
REF2-1	1.09	0.39	0.53
REF2-2	1.24	0.48	0.49

Notes:

a: Shannon-Weaver is an index which measures species diversity. The higher the number, the greater the species diversity.

b: Relative H' shows how close the sample is to maximum diversity, even distribution of organisms among the taxa is represented by "1".

c: Simpson's is an index which measures the probability of two randomly selected organisms from a sample belonging to the same taxon. It is indirectly proportional to heterogeneity (the higher the value, the more homogeneous the sample.

Table 7-11
Community Composition of Six Major Taxonomic Groups
Sauget Area I

Station	Taxa Group (6 Total)	Number of Organisms	Relative Abundance (%)
F-1	Chironomidae	74	47.44
F-1	Mollusca	34	21.79
F-1	Non-Chironomid Insects	26	16.67
F-1	Oligochaeta	22	14.10
F-2	Non-Chironomid Insects	96	62.34
F-2	Oligochaeta	44	28.57
F-2	Chironomidae	14	9.09
F-3	Oligochaeta	286	81.25
F-3	Chironomidae	36	10.23
F-3	Non-Chironomid Insects	24	6.82
F-3	Mollusca	6	1.70
BP-1	Non-Chironomid Insects	56	44.44
BP-1	Oligochaeta	48	38.10
BP-1	Chironomidae	12	9.52
BP-1	Other*	10	7.94
BP-2	Oligochaeta	178	67.94
BP-2	Chironomidae	54	20.61
BP-2	Non-Chironomid Insects	30	11.45
BP-3	Oligochaeta	122	80.79
BP-3	Non-Chironomid Insects	17	11.26
BP-3	Chironomidae	12	7.95
PDC-1	Oligochaeta	85	92.39
PDC-1	Non-Chironomid Insects	6	6.52
PDC-1	Chironomidae	1	1.09
PDC-2	Oligochaeta	138	93.24
PDC-2	Chironomidae	4	2.70
PDC-2	Non-Chironomid Insects	4	2.70
PDC-2	Crustacea	1	0.68
PDC-2	Mollusca	1	0.68
REF2-1	Oligochaeta	3210	72.62
REF2-1	Non-Chironomid Insects	820	18.55
REF2-1	Chironomidae	320	7.24
REF2-1	Mollusca	50	1.13
REF2-1	Crustacea	20	0.45
REF2-2	Oligochaeta	62	71.26
REF2-2	Chironomidae	14	16.09
REF2-2	Non-Chironomid Insects	11	12.64

*Hirudinea and Nematoda

Table 7-12
Hilsenhoff's Biotic Index of Organic Stream Pollution
Sauget Area I

Summation of Replicates	Hilsenhoff's Biotic Index (Expanded to Include Non-Arthropod Invertebrates)
BP-1	7.88
BP-2	8.86
BP-3	9.18
F-1	7.63
F-2	6.71
F-3	8.65
PDC-1	9.55
PDC-2	9.69
REF2-1	9.42
REF2-2	9.04
Value of Biotic Index	**Degree of Impairment**
0 - 3.5	None
3.51 - 4.5	Possible/Slight
4.51 - 5.5	Some
5.51 - 6.5	Fairly Significant
6.51 - 7.5	Significant
7.51 - 8.5	Very Significant
8.51 - 10.0	Severe

*Adapted from Hilsenhoff, 1987.

Table 7-13
***Hyalella azteca* Acute Toxicity Results**
Sauget Area I

***Results of 10 day Hyalella azteca* Acute Toxicity Tests**

Survival significantly lower than lab control *P<0.05		
ID	**Survival (%)**	**Growth (mg)**
Lab Control	**86**	**0.223**
None from Section F or Borrow Pit Lake		

Growth Significantly lower than lab control P<0.05		
ID	**Survival (%)**	**Growth (mg)**
Lab Control	**86**	**0.202**
Borrow Pit 1	89	0.156
Borrow Pit 1 Dup.	94	0.154
Borrow Pit 3	91	0.154

Survival and Growth NOT significantly lower than lab control		
ID	**Survival (%)**	**Growth (mg)**
Lab Control	**86**	**0.202**
Creek Section F-1	91	0.221
Creek Section F-2	86	0.219
Creek Section F-3	83	0.183
Borrow Pit 2	96	0.172
Lab Control	**98**	**0.268**
PDC-1 (reference)	98	0.254
PDC-2 (reference)	98	0.404
Reference 2-1	98	0.393
Reference 2-2	98	0.335

Table 7-14
***Hyallela azteca* 42 Day Chronic Survival, Growth, And Reproduction Results**
Sauget Area I

	ID	Day 28 Mean Survival (%)	Day 28 Mean Dry Weight (mg)	Day 35 Mean Survival (%)	Day 42 Mean Survival (%)	Day 42 Mean Dry Weight (mg)	Day 42 Mean Number of Neonates/Female
Lotic, creek habitat	**PDC-1 (reference)**	**90**	**0.443**	**83**	**79**	**0.346**	**2.6**
	PDC-2 (reference)	**89**	**0.648**	**85**	**80**	**0.498**	**6.2**
	Creek Section F-1	91	0.639	89	84	0.397	4.8
	Creek Section F-2	90	0.554	74	70	0.447	3.8
	Creek Section F-3	89	0.661	85	76	0.406	4.8
	Ref-2-1 (creek portion)	70*		64	65	0.459	2.3
	*Statistically significant reduction in lotic sample response relative to reference samples PDC-1 and PDC-2; P<0.05						
Lentic, pond habitat	**Ref-2-2**	**87**	**0.458**	**85**	**83**	**0.351**	**3.4**
	Borrow Pit 1	93	0.594	88	83	0.380	4.1
	Borrow Pit 1 Dup.	89	0.636	80	75	0.423	4.2
	Borrow Pit 2	82	0.563	74	73	0.390	4.3
	Borrow Pit 3	95	0.470	86	84	0.322	5.3
	No lentic samples exhibited statistically significant reductions in response compared to PDC-1, PDC-2, or Ref-2-2.						
Laboratory Controls	12552	55	0.982	51	46	0.231	0.6
	12615	62	0.296	36	33	0.299	1.8
	12622	55	0.501	38	35	0.377	4.0
	12668	73	0.477	65	59	0.293	2.2

Note: Reference area samples were used for comparison because survival in the laboratory control samples was low.

Table 7-15
Acute Sediment Toxicity Testing Results with *Chironomus tentans*
Sauget Area I

***Chironomus tentans* Acute Toxicity Results (Day 10)**

Survival significantly lower than lab control P<0.05			
ID	**Survival (%)**	**Growth (mg)**	**Interpretation**
Lab Control	**94**	**1.761**	
Borrow Pit 1	64	2.643	
Borrow Pit 1 Dup.	40	4.071	
Borrow Pit 2	14	0.956	Acute toxicity
Borrow Pit 3	53	2.996	
Creek Section F-1	31	2.686	Acute toxicity
Creek Section F-2	16	0.053*	Acute toxicity
Creek Section F-3	10	0.969	Acute toxicity
Lab Control	**100**	**2.065**	
PDC-1 (reference)	16	1.052*	Acute toxicity
PDC-2 (reference)	55	2.699	
Reference 2-1	13	0.346*	Acute toxicity
Reference 2-2	11	1.409	Acute toxicity

* Significant difference in growth.

Table 7-16
Results of *Chironomus tentans* Chronic Survival, Growth, Emergence, and Reproduction Toxicity Tests
Sauget Area I

	ID	Day 20 Mean Survival (%)	Day 20 Mean Ash Weight (mg)	Emergence Proportion (%)	Mean Eggs Hatched/ Female	Mean Days Survived, Female	Mean Days Survived, Male
Lab Control	**12622**	**46**	**2.959**	**45**	**554**	**3.1**	**4.9**
	Borrow Pit 1	0*		5*	0*	0*	0.7*
	Borrow Pit 1 Dup.	0*		8*	127*	0.3*	0.8*
	Borrow Pit 3	6*		14*	106*	0.8*	1.2*
Lab Control	**12668**	**65**	**2.923**	**69**	**354**	**3.6**	**4.3**
	PDC-2 (reference)	69	3.074	13*	249	1.1*	1.4*

*Significantly different from corresponding laboratory control; $P<0.05$

Note: Samples exhibiting acute toxicity were not tested for chronic toxicity.

Table 7-17
Sediment Triad Evaluation
Dead Creek Section F and Borrow Pit Lake
Sauget Area I

Measure	Dead Creek Section F SED-CSF-S1	Dead Creek Section F SED-CSF-S2	Dead Creek Section F SED-CSF-S3	Borrow Pit Lake BPL-ESED-S1	Borrow Pit Lake BP-ESED-S-2	Borrow Pit Lake BPL-ESED-S3	Prairie du Pont Ref. Area 1 SED-RA1-S1	Prairie du Pont Ref. Area 1 SED-RA1-S2	Long Slash Creek Ref Area 2 SED-RA2-S1	Ref Area 2 SED-RA2-S2	Average Reference Area
Chemistry											
Number of COPCs above TEC or LEL	**14**	**12**	**11**	**6**	**10**	**7**	3	1	1	3	2
Number of COPCs above PEC or SEL	**4**	**6**	**4**	**1**	**2**	0	0	0	0	0	0
Benthic Community											
Number of Organisms	156	154	358	126	262	151	92	148	4420	87	109*
Number of Taxa	16	11	17	18	17	14	8	9	16	13	10*
TOC, %	4	14	6 1	6.7	4.5	3 3	1.2	2.3	1.3	2	1 7
Shannon Weaver Index[1]	2.28	1.66	1 6	2.53	2.09	1 56	0.66	0.58	1 09	1.24	0.89
Relative H'[2]	0.82	0 69	0.56	0.87	0.74	0.59	0.32	0.26	0.39	0 48	0 36
Simpsons Index[3]	0 14	0 25	0 31	0.11	0.23	0.35	0.74	0 79	0 53	0.49	0.64
Modified Hilsenhoff Biotic Index	7.88	8.86	9.18	7.63	6.71	8.65	9.55	9 69	9.42	9.04	9.43
Hilsenhoff Degree of Impairment	Very Significant	Severe	Severe	Very Significant	Significant	Severe	Severe	Severe	Severe	Severe	Severe
Sediment Toxicity[2]											
Amphipod Acute Survival	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA
Amphipod Acute Growth Effects	NE	NE	NE	**X**	NE	**X**	NE	NE	NE	NE	NA
Amphipod Chronic Survival	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA
Amphipod Chronic Growth Effects	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA
Amphipod Chronic Reproduction Effects	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NA
Chironomid Acute Survival	X	X	X	X	X	X	X	X	X	X	NA
Chironomid Acute Growth Effects	NE	X	NE	NE	NE	NE	X	NE	X	NE	NA
Chironomid Chronic Survival	NT	NT	NT	**X**	NT	**X**	NT	NE	NT	NT	NA
Chironomid Chronic Growth Effects	NT	NT	NT	NT	NT	NT	NT	NE	NT	NT	NA
Chironomid Chronic Effects on Emergence	NT	NT	NT	X	NT	X	NT	X	NT	NT	NA
Chironomid Chronic Reproductive Effects	NT	NT	NT	X	NT	X	NT	X	NT	NT	NA

[1] The Shannon-Weaver index is a measure of species diversity; the higher the index, the more diverse the sample.
[2] Relative H' is a measure of the eveness of distribution of organisms among taxa. The most even distribution is theoretically has a H' value of 1.
[3] Simpson's Index is indirectly related to sample heterogeneity; the lower the value, the more heterogeneous the sample.
[4] X indicates an effect was measured in that sample. NT indicates the sample was not tested for that effect. Samples for which acute toxicity was high were not carried through chronic toxicity testing.
NA = not applicable
NE = no statistically significant effect measured in sample.
* indicates that sample SED-RA2-S1 was not included in average
Shading indicates a possible measurement of effect relative to the reference areas

Table [illegible]-18
List of Fish and Wildlife Species Observed On and Near Dead Creek and the Borrow Pit Lake
Sauget Area I

		Dead Creek Floodplain				Dead Creek and Borrow Pit Lake			
Common Name	Scientific Name	Wet/ Upland Shrubs	Wet/Dry Field	Riparian Woods	Terrestrial Wetland System[1]	Dead & Prairie du Pont Creeks	Borrow Pit Lake	Aquatic System[1]	Mississippi River
AMPHIBIANS									
Northern cricket frog	*Acris crepitans*				O			O	
Bullfrog	*Rana catesbeiana*				O			O	
American Toad	*Bufo americanus*	O	X	X		X	X		
Gray Treefrog	*Hyla versicolor*	X		O		X	X		
Pickerel Frog	*Rana palustris*	X	O	X		X	X		
REPTILES									
Red-eared Slider	*Pseudemys scripta*					O			X
Painted Turtle	*Chrysemys picta*					O	O		X
BIRDS									
Yellow-rumped warbler	*Dendroica coronata*				O				
White-crowned sparrow	*Zonotrichia leucophrys*				O				
White-throated sparrow	*Zonotrichia albicolis*				O				
Vesper sparrow	*Pooecetes gramineus*				O				
Swamp sparrow	*Melospiza geogiana*				O				
Red-billed gull	*Larus delawarensis*							O	
Red-bellied woodpecker	*Melanerpes carolinus*				O				
Orange-crowned warbler	*Vermivora celata*				O				
Norhern flicker	*Colaptes auratus*				O				
Nashville warbler	*Vermivora ruficapilla*				O				
House finch	*Carpodacus mexicanus*				O				
Hooded merganser	*Lophodytes cucullatus*				O			O	
Herring gull	*Larus argentatus*							O	
Great horned owl	*Bubo virginianus*				O				
Golden-crowned kinglet	*Regulus satrapa*				O				
Gadwall	*Anas*				O			O	
Fox sparrow	*Passerella ilica*				O				
Field sparrow	*Spizella pusilla*				O				
Eurasian tree sparrow	*Passer montanus*				O				

Table 7-18
List of Fish and Wildlife Species Observed On and Near Dead Creek and the Borrow Pit Lake
Sauget Area I

		Dead Creek Floodplain				Dead Creek and Borrow Pit Lake			
Common Name	**Scientific Name**	**Wet/ Upland Shrubs**	**Wet/Dry Field**	**Riparian Woods**	**Terrestrial Wetland System[1]**	**Dead & Prairie du Pont Creeks**	**Borrow Pit Lake**	**Aquatic System[1]**	**Mississippi River**
Eastern towhee	*Pipilo erythrophthalmus*				O				
Eastern meadowlark	*Sturnella magna*				O				
Eastern bluebird	*Sialia sialis*								
Dark-eyed Junco	*Junco hyemalis*				O				
Canada Goose	*Branta canadensis*				O			O	
Black-capped Chickadee	*Poecile atricapillus*				O				
Brown Thrasher	*Toxostoma rufum*				O				
American Black Duck	*Anas rubripes*				O			O	
American Coot	*Fulica americana*							O	
Great Blue Heron	*Ardea herodias*		X	O	O	O	X	O	O
Great Egret	*Casmerodius albus*		O			O	O		O
Snowy Egret	*Egretta caerulea*					O	O		O
Little Blue Heron	*Egretta thula*					O	O		O
Cattle Egret	*Bubulcus ibis*		O						
Green-backed Heron	*Butorides striatus*	O		X		O	O		O
Black-crowned Night-Heron	*Nycticorax nycticorax*			X	O	O	X	O	O
Wood Duck	*Aix sponsa*	X		X	O	O	X	O	X
Mallard	*Anas platyrhynchos*	X	X	X	O	O	X	O	X
Turkey Vulture	*Cathartes aura*	X	O	X			X		
Bald Eagle[2]	*Haliaeetus leucocephalus*					X			X
Red-tailed Hawk	*Buteo jamaicensis*	X	O	O	O				
American Kestrel	*Falco sparverius*	O	O		O				
Northern Bobwhite	*Colinus virginianus*	O	X		O				
Killdeer	*Charadrius vociferus*		O		O				
Rock Dove	*Columba livia*		X		O				
Mourning Dove	*Zenaida macroura*	O	O	O	O				
Yellow-billed Cuckoo	*Coccyzus americanus*	O		O					
Chimney Swift	*Chaetura pelagica*	O	X	X		O	O		X
Belted Kingfisher	*Ceryle alcyon*				O	O	O	O	O
Red-headed Woodpecker	*Melanerpes erythrocephalus*			O					
Downy Woodpecker	*Picoides pubescens*	O		O	O				
Eastern Phoebe	*Sayornis phoebe*	X		O	O	O	X		X
Eastern Kingbird	*Tyrannus tyrannus*	O	O			X	X		X
Tree Swallow	*Tachycineta bicolor*	X	O	X	O	O	X		X
Bank Swallow	*Riparia riparia*	X	O	X		X	X		X
Cliff Swallow	*Hirundo pyrrhonota*	X	O	X		X	X		X
Barn Swallow	*Hirundo rustica*	X	O	X		O	O		X

Table 7-18
List of Fish and Wildlife Species Observed On and Near Dead Creek and the Borrow Pit Lake
Sauget Area I

		Dead Creek Floodplain				Dead Creek and Borrow Pit Lake			
Common Name	**Scientific Name**	**Wet/ Upland Shrubs**	**Wet/Dry Field**	**Riparian Woods**	**Terrestrial Wetland System[1]**	**Dead & Prairie du Pont Creeks**	**Borrow Pit Lake**	**Aquatic System[1]**	**Mississippi River**
Blue Jay	*Cyanocitta cristata*	X		O	O				
American Crow	*Corvus brachyrhynchos*	X	O	O	O				
Carolina Chickadee	*Parus carolinensis*	X		O	O				
Tufted Titmouse	*Parus bicolor*			O	O				
White-breasted Nuthatch	*Sitta carolinensis*			O	O				
Brown Creeper	*Certhia americana*			O	O				
Carolina Wren	*Thryothorus ludovicianus*	O		X	O				
House Wren	*Troglodytes aedon*	O		O					
American Robin	*Turdus migratorius*	O	O	O	O				
Gray Catbird	*Dumetella carolinensis*	O		O	O				
Nothern Mockingbird	*Mimus polyglottos*	X	X		O				
Cedar Waxwing	*Bombycilla cedrorum*	O		O	O				
European Starling	*Sturnus vulgaris*	X	O	O	O				
Common Yellowthroat	*Geothylpis trichas*	O		X					
Northern Cardinal	*Cardinalis cardinalis*	O		O	O				
Indigo Bunting	*Passerina cyanea*	O		O					
Song Sparrow	*Melospiza melodia*	O	O	X	O				
Red-winged Blackbird	*Agelaius phoeniceus*	O	O	O	O	O	O		
Common Grackle	*Quiscalus quiscula*	O	X	O	O				
Northern Oriole	*Icterus galbula*			O					
American Goldfinch	*Carduelis tristis*	O	O	O	O				
House Sparrow	*Passer domesticus*		X		O				
MAMMALS									
Eastern gray squirrel	*Sciurus carolinensis*				O				
Eastern cottontail	*Sylvilagus floridanus*				O				
Eastern chipmunk	*Tamias striatus*				O				
Common muskrat	*Ondatra zibethicus*				O				
Gray Squirrel	*Sciurus carolinensis*	O		O					
Fox Squirrel	*Sciurus niger*			O					
Beaver	*Castor canadensis*			O	O	O	O		O
Raccoon	*Procyon lotor*	O	X	O		O	O		O
White-tailed Deer	*Odocoileus virginianus*	O	O	O		O			

Table 7-18
List of Fish and Wildlife Species Observed On and Near Dead Creek and the Borrow Pit Lake
Sauget Area I

		Dead Creek Floodplain				Dead Creek and Borrow Pit Lake			
Common Name	**Scientific Name**	**Wet/ Upland Shrubs**	**Wet/Dry Field**	**Riparian Woods**	**Terrestrial Wetland System[1]**	**Dead & Prairie du Pont Creeks**	**Borrow Pit Lake**	**Aquatic System[1]**	**Mississippi River**
FISH*									
Blackstripe topminnow	*Fundulus notatus*							O	
Bowfin	*Amia calva*					SO	O		
Gizzard Shad	*Dorosoma cepedianum*					SO			
Grass Pickeral	*Esox americanus*					SO			
Common Stoneroller	*Campostoma anomalum*					SO			
Goldfish	*Carassius auratus*					SO			
Carp	*Cyprinus carpio*					SO	O		
Golden Shiner	*Notemigonus crysoleucas*					SO			
Bigmouth Shiner	*Notropis dorsalis*					SO			
Red Shiner	*Notropis lutrensis*					SO			
Sand Shiner	*Notropis stramineus*					SO			
Fathead Minnow	*Pimephales promelas*					SO			
Creek Chub	*Semotilus atromaculatus*					SO			
White Sucker	*Catastomus commersoni*					SO			
Bigmouth Buffalo	*Ictiobus cyprinellus*					SO			
Black Bullhead	*Ictalurus melas*					SO		O	
Yellow Bullhead	*Ictalurus natalis*					SO			
Channel Catfish	*Ictalurus punctatus*					O & SO			
Mosquitofish	*Gambusia affinis*					SO			
Green Sunfish	*Lepomis cyanellus*					SO			
Warmouth	*Lepomis gulosus*					SO			
Orangespotted Sunfish	*Lepomis humilis*					SO			
Bluegill	*Lepomis macrochirus*					SO	O		
Largemouth Bass	*Micropterus salmoides*					SO	O		
Black Crapple	*Pomoxis nigromaculatus*					SO	O		
Freshwater Drum	*Aplodinotus grunniens*					SO	O		
White Bass	*Morone chrysops*						O		
Crapple	*Pomoxis spp*						O		
White Crapple	*Pomoxis annularis*						O		
Brown Bullhead	*Amelurus nebulosus*						O		
Black Bullhead	*Amelurus melas*						O		
Gar	*Lepisosteus spp.*						O		
Spotted Gar	*Lepisosteus oculatus*						O		
Johnny Darter	*Etheostoma nigrum*						O		

Table 7-18
List of Fish and Wildlife Species Observed On and Near Dead Creek and the Borrow Pit Lake
Sauget Area I

		Dead Creek Floodplain				Dead Creek and Borrow Pit Lake			
Common Name	**Scientific Name**	**Wet/ Upland Shrubs**	**Wet/Dry Field**	**Riparian Woods**	**Terrestrial Wetland System[1]**	**Dead & Prairie du Pont Creeks**	**Borrow Pit Lake**	**Aquatic System[1]**	**Mississippi River**
Silver Carp	*Hypophthalmichthys molitrix*						O		
Quillback	*Carpiodes cyprinus*						O		
Moon eye	*Hiodon tergisus*						O		
Gold eye	*Hiodon alosoides*						O		
Walleye	*Stizostedion vitreum*						O		
Small unidentified fish						O	O		O

X - Species Probably Utilizes Habitat   O - Species Observed in the Habitat
SO - Species Observed in the Prairie du Pont drainage during 1984 State Stream Survey

* From Atwood, E.R., 1992. Assessment of Fisheries Quality of Streams in the American Bottoms Basin, IL Dept. of Conservation, 48 pp.
Except where noted, observations were made during wildlife survey in 1996.
[1]Observations made in November 2000.
[2]

Table 7-19
Plant Concentrations in Dead Creek Section F and both Reference Areas
Sauget Area I

Compound	Site Maximum	Site Average	Reference Maximum	Reference Average
Herbicides (ug/kg)				
2,4-D	ND	ND	ND	ND
2,4-DB	ND	ND	ND	ND
Dicamba	ND	ND	1.8	5.9
Dichloroprop	**7**	**28.5**	**ND**	**ND**
MCPA	ND	ND	ND	ND
MCPP	ND	ND	1300	1150
Pentachlorophenol	ND	ND	2	6
Metals (mg/kg)				
Aluminum, Total	44	37	360	260
Antimony	**0.13**	**0.115**	**ND**	**ND**
Arsenic, Total	0.56	0.49	1.1	0.78
Barium, Total	ND	ND	ND	ND
Cadmium, Total	**0.097**	**0.1735**	**ND**	**ND**
Chromium, Total	ND	ND	0.53	0.39
Copper, Total	**2.1**	**2**	**1.3**	**1.13**
Iron	ND	ND	ND	ND
Lead, Total	**1.2**	**0.82**	**0.64**	**0.47**
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Molybdenum	ND	ND	ND	ND
Nickel, Total	**2.6**	**1.9**	**ND**	**ND**
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Zinc, Total	**26**	**23**	**8.3**	**7.55**
Total PCBs (ug/kg)	ND	ND	ND	ND
Pesticides (ug/kg)				
4,4'-DDD	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND
Aldrin	0.81	3.905	1	4
Alpha Chlordane	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND
Gamma Chlordane	**3.1**	**5.05**	**ND**	**ND**
gamma-BHC (Lindane)	ND	ND	ND	ND
Heptachlor	1.9	1.85	3.8	5.4
Heptachlor epoxide	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND
SVOC (ug/kg)				
bis(2-ethylhexyl)phthalate	ND	ND	ND	ND
Di-n-butylphthalate	ND	ND	ND	ND
Diethylphthalate	ND	ND	ND	ND
Acenaphthylene	**32**	**58.5**	**ND**	**ND**
Fluoranthene	ND	ND	ND	ND
Benzo(b)fluoranthene	**59**	**72**	**16**	**51**
Benzo(k)fluoranthene	**52**	**68.5**	**21**	**53**
Benzo(a)pyrene	**140**	**113**	**37**	**26**
Benzo(g,h,i)perylene	360	223	390	315
Indeno(1,2,3-c-d)pyrene	300	192.5	440	330
Dibenz(a,h)anthracene	76	80.5	400	290
2,3,7,8-TCDD TEQ Mammal	0.000202	0.00017	8.46E-05	5.75E-05
2,3,7,8-TCDD TEQ Bird	9.73E-05	8.48E-05	2.97E-05	2.06E-05

Table 7-20a
Results of Food Chain Modeling
Sauget Area I Creek Sector F

	SCENARIO[1]							
	Mallard Duck-- Creek Sector F Plant Ingestion-- Average shallow sediment		Mallard Duck-- Creek Sector F Plant Ingestion-- Maximum shallow sediment		Mallard Duck--Creek Sector F Plant Ingestion-- Average combined shallow and deep sediment		Mallard Duck--Creek Sector F Plant Ingestion-- Maximum combined shallow and deep sediment	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	NB	NB	NB	NB	NB	NB	NB	NB
2,4-DB	0.E+00	NB	0.E+00	NB	0.E+00	NB	0.E+00	NB
Dicamba	NB	NB	NB	NB	NB	NB	NB	NB
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	NB	NB	NB	NB	NB	NB	NB	NB
MCPP	NB	NB	NB	NB	NB	NB	NB	NB
Pentachlorophenol	NB	NB	NB	NB	NB	NB	NB	NB
Aluminum, Total	1.E-04	NB	4.E-01	NB	1.E-04	NB	4.E-01	NB
Antimony	NB	NB	NB	NB	NB	NB	NB	NB
Arsenic, Total	2.E-05	7.E-06	4.E-02	2.E-02	2.E-05	7.E-06	4.E-02	2.E-02
Barium, Total	9.E-06	4.E-06	2.E-02	1.E-02	9.E-06	4.E-06	2.E-02	1.E-02
Beryllium, Total	NB	NB	NB	NB	NB	NB	NB	NB
Cadmium, Total	2.E-05	2.E-06	7.E-02	5.E-03	2.E-05	2.E-06	7.E-02	5.E-03
Chromium, Total	2.E-05	5.E-06	6.E-02	1.E-02	2.E-05	5.E-06	6.E-02	1.E-02
Copper, Total	1.E-05	8.E-06	3.E-02	2.E-02	3.E-05	2.E-05	2.E-01	2.E-01
Iron	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	2.E-04	2.E-05	8.E-01	8.E-02	2.E-04	2.E-05	8.E-01	8.E-02
Manganese	3.E-07	NB	8.E-04	NB	3.E-07	NB	8.E-04	NB
Mercury	8.E-05	8.E-06	3.E-01	3.E-02	8.E-05	8.E-06	3.E-01	3.E-02
Molybdenum	4.E-07	4.E-08	2.E-03	2.E-04	4.E-07	4.E-08	2.E-03	2.E-04
Nickel, Total	6.E-06	4.E-06	2.E-02	1.E-02	6.E-06	4.E-06	2.E-02	1.E-02
Selenium	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Silver	NB	NB	NB	NB	NB	NB	NB	NB
Vanadium, Total	3.00E-06	NB	7.00E-03	NB	3E-06	NB	7E-03	NB
Zinc, Total	4.E-04	4.E-05	9.E-01	1.E-01	5.E-04	6.E-05	**2.E+00**	2.E-01
Total PCBs	3.E-07	3.E-08	1.E-03	1.E-04	4.E-06	4.E-07	6.E-02	6.E-03
Total DDT	9.E-06	9.E-07	2.E-02	2.E-03	9.E-06	9.0.E-07	2.E-02	2.E-03
Aldrin	NB	NB	NB	NB	NB	NB	NB	NB
Alpha Chlordane	1.E-09	3.E-10	4.E-06	8.E-07	1.E-09	3.E-10	4.E-06	8.E-07
delta-BHC	5.E-10	1.E-10	1.E-06	2.E-07	5.E-10	1.E-10	1.E-06	2.E-07
Dieldrin	1.E-07	NB	2.E-04	NB	1.E-07	NB	2.E-04	NB
Endosulfan I	2.E-10	NB	9.E-07	NB	2.E-10	NB	9.E-07	NB
Endosulfan II	4.E-10	NB	1.E-06	NB	4.E-10	NB	1.E-06	NB
Endosulfan sulfate	2.E-10	NB	4.E-07	NB	2.E-10	NB	4.E-07	NB
Endrin aldehyde	7.E-07	7.E-08	2.E-03	2.E-04	7.E-07	7.E-08	2.E-03	2.E-04
Endrin ketone	6.E-07	6.E-08	2.E-03	2.E-04	6.E-07	6.E-08	2.E-03	2.E-04
Gamma Chlordane	2.E-07	4.E-08	4.E-04	9.E-05	2.E-07	4.E-08	4.E-04	9.E-05
gamma-BHC (Lindane)	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Heptachlor	NB	NB	NB	NB	NB	NB	NB	NB
Heptachlor epoxide	NB	NB	NB	NB	NB	NB	NB	NB
Methoxychlor	NB	NB	NB	NB	NB	NB	NB	NB
Total PAHs	2.E-06	2.E-07	8.00E-03	8.E-04	2.E-06	2.E-07	8.E-03	8.E-04
bis(2-ethylhexyl)phthalate	0.E+00	NB	0.E+00	NB	0.E+00	NB	0.E+00	NB
Di-n-butylphthalate	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0	0
Diethylphthalate	NB	NB	NB	NB	NB	NB	NB	NB
Acenaphthylene	*	*	*	*	*	*	*	*
Fluoranthene	*	*	*	*	*	*	*	*
Benzo(b)fluoranthene	*	*	*	*	*	*	*	*
Benzo(k)fluoranthene	*	*	*	*	*	*	*	*
Benzo(a)pyrene	*	*	*	*	*	*	*	*
Benzo(g,h,i)perylene	*	*	*	*	*	*	*	*
Indeno(1,2,3-c-d)pyrene	*	*	*	*	*	*	*	*
Dibenz(a,h)anthracene	*	*	*	*	*	*	*	*
Dioxin - TEQ	1.E-05	1.E-06	3.E-02	3.E-03	1.E-05	1.E-06	3.E-02	3.E-03

[1]In this scenario, the mallard is assumed to ingest plants, sediment, and surface water.

Table 7-20a
Results of Food Chain Modeling
Sauget Area I Creek Sector F

	SCENARIO[2]									
	Tree Swallow--Creek Sector F Insect Ingestion--Average shallow sediment		Tree Swallow--Creek Sector F Insect Ingestion--Average combined shallow and deep sediment		Mallard Duck--Creek Sector F Snail Ingestion Based on BAFs from Average shallow sediment		Great Blue Heron--Creek Sector F Fish Ingestion--based on BAF and average shallow sediment		Bald Eagle--Creek Sector F Fish Ingestion--based on BAF and average shallow sediment	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
2,4-DB	0 E+00	NB	0 E+00	NB	NE	NB	NE	NB	NE	NB
Dicamba	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
MCPP	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Pentachlorophenol	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Aluminum, Total	**3.E+00**	NB	**3.E+00**	NB	8 E-04	NB	3.E-03	NB	3.E-06	NB
Antimony	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Arsenic, Total	4 E-02	2 E-02	4 E-02	2 E-02	6 E-05	2 E-05	2.E-06	7.E-07	3.E-09	1.E-09
Barium, Total	1 E-03	5 E-04	1 E-03	5 E-04	9 E-06	4 E-06	1.E-05	6.E-06	2.E-08	9.E-09
Beryllium, Total	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Cadmium, Total	**6.E+00**	4 E-01	**6.E+00**	4 E-01	1 E-04	9.E-06	0.E+00	0 E+00	0.E+00	0.E+00
Chromium, Total	**2.E+00**	4 E-01	**2.E+00**	4 E-01	2 E-04	5 E-05	5 E-03	1 E-03	6.E-06	1.E-06
Copper, Total	5 E-01	4 E-01	7 E-01	5 E-01	2 E-04	2 E-04	9.E-04	7.E-04	1.E-06	8.E-07
Iron	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	1 E+00	1 E-01	1 E+00	1 E-01	2 E-03	2 E-04	1.E-02	1 E-03	1.E-05	1.E-06
Manganese	2 E-05	NB	2 E-05	NB	3 E-07	NB	2 E-07	NB	3.E-10	NB
Mercury	**2.E+01**	**2.E+00**	**2.E+01**	**2.E+00**	8 E-05	8.E-06	1 E+00	1.E-01	1.E-03	1.E-04
Molybdenum	1 E-04	1 E-05	1 E-04	1.E-05	4 E-07	4 E-08	2.E-06	2.E-07	2.E-09	2.E-10
Nickel, Total	6 E-02	5 E-02	6 E-02	5.E-02	2 E-05	2 E-05	4.E-07	3.E-07	5.E-10	4.E-10
Selenium	0 E+00	0 E+00	0 E+00	0 E+00	NE	NE	NE	NE	NE	NE
Silver	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Vanadium, Total	4 E-05	NB	4 E-05	NB	3 E-06	NB	5.E-07	NB	8.E-10	NB
Zinc, Total	**4.E+00**	4 E-01	**4.E+00**	5 E-01	2 E-03	2 E-04	2 E-01	2.E-02	2.E-04	3.E-05
Total PCBs	**1.E+01**	1 E+00	**2.E+02**	**2.E+01**	6 E-06	6 E-07	3.E-03	3.E-04	4.E-06	4.E-07
Total DDT	**7.E+00**	7 E-01	**1.E+01**	1 E+00	9 E-06	9 E-07	3 E-01	3.E-02	3.E-04	3.E-05
Aldrin	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Alpha Chlordane	0 E+00	0 E+00	0 E+00	0 E+00	1 E-09	3 E-10	0 E+00	0.E+00	0.E+00	0.E+00
delta-BHC	0 E+00	0 E+00	0 E+00	0.E+00	5 E-10	1.E-10	0 E+00	0.E+00	0.E+00	0.E+00
Dieldrin	0 E+00	NB	0 E+00	NB	1 E-07	NB	0 E+00	NB	0.E+00	NB
Endosulfan I	0 E+00	NB	0 E+00	NB	2 E-10	NB	0 E+00	NB	0.E+00	NB
Endosulfan II	0 E+00	NB	0 E+00	NB	4 E-10	NB	0 E+00	NB	0.E+00	NB
Endosulfan sulfate	5 E-04	NB	7 E-04	NB	2 E-10	NB	0.E+00	NB	0.E+00	NB
Endrin aldehyde	0 E+00	0 E+00	0 E+00	0 E+00	7 E-07	7.E-08	0 E+00	0.E+00	0.E+00	0.E+00
Endrin ketone	2 E-01	2 E-02	3 E-01	3 E-02	6 E-07	6 E-08	0.E+00	0.E+00	0.E+00	0.E+00
Gamma Chlordane	8 E-03	2 E-03	1 E-02	2 E-03	1 E-07	3 E-08	0 E+00	0 E+00	0.E+00	0.E+00
gamma-BHC (Lindane)	0 E+00	0 E+00	0 E+00	0 E+00	NE	NE	NE	NE	NE	NE
Heptachlor	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Heptachlor epoxide	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Methoxychlor	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Total PAHs	6 E-03	6 E-04	7.E-03	7 E-04	5 E-08	5 E-09	4.E-08	4.E-09	5.E-11	5.E-12
bis(2-ethylhexyl)phthalate	0 E+00	NB	0 E+00	NB	NE	NB	NE	NB	NE	NB
Di-n-butylphthalate	0 E+00	0 E+00	0 E+00	0 E+00	NE	NE	NE	NE	NE	NE
Diethylphthalate	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Acenaphthylene	•	•	•	•	•	•	•	•	•	•
Fluoranthene	•	•	•	•	•	•	•	•	•	•
Benzo(b)fluoranthene	•	•	•	•	•	•	•	•	•	•
Benzo(k)fluoranthene	•	•	•	•	•	•	•	•	•	•
Benzo(a)pyrene	•	•	•	•	•	•	•	•	•	•
Benzo(g,h,i)perylene	•	•	•	•	•	•	•	•	•	•
Indeno(1,2,3-c-d)pyrene	•	•	•	•	•	•	•	•	•	•
Dibenz(a,h)anthracene	•	•	•	•	•	•	•	•	•	•
Dioxin - TEQ	**4.E+00**	4 E-01	**6.E+00**	6 E-01	6 E-05	6 E-06	1.E-02	1.E-03	1.E-05	1.E-06

[2]The biota concentrations in these scenarios was modeled using site-specific BAFs. The mallard was assumed to ingest snails, sediment, and surface water. The great blue heron was assumed to ingest fish and surface water. The eagle was assumed to ingest fish and surface water. The tree swallow was assumed to ingest insects and surface water. In addition to site-specific BAFs, the insect concentrations for the tree swallow scenario were modeled using literature BSAFs and literature regression equations (for some metals and PCBs).

Table 7-20a
Results of Food Chain Modeling
Sauget Area I Creek Sector F

	SCENARIO[3]											
	Female Muskrat--Creek Sector F Plant Ingestion--Average shallow sediment		Female Muskrat--Creek Sector F Plant Ingestion--Maximum shallow sediment		Female Muskrat--Creek Sector F Plant Ingestion--Average combined shallow and deep sediment		Female Muskrat--Creek Sector F Plant Ingestion--Maximum combined shallow and deep sediment		Female Muskrat--Creek Sector F Snail Ingestion--based on BAF and average sediment		River Otter--Dead Creek Sector F Fish Ingestion--based on BAF and average shallow sediment	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	6.E-05	1.E-05	6.E-05	1.E-05	6.E-05	1.E-05	6.E-05	1.E-05	6.E-05	1.E-05	1.E-08	3.E-09
2,4-DB	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Dicamba	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
MCPP	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Pentachlorophenol	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Aluminum, Total	**5.E+01**	**5.E+00**	**7.E+01**	**7.E+00**	**5.E+01**	**5.E+00**	**7.E+01**	**7.E+00**	**3.E+02**	**3.E+01**	1.E-02	1.E-03
Antimony	9.E-01	9.E-02	1.E+00	1.E-01	9.E-01	9.E-02	1.E+00	1.E-01	**2.E+00**	2.E-01	3.E-05	3.E-06
Arsenic, Total	1.E-01	NB	1.E-01	NB	1.E-01	NB	1.E-01	NB	4.E-01	NB	4.E-06	NB
Barium, Total	5.E-02	4.E-02	6.E-02	4.E-02	5.E-02	4.E-02	6.E-02	4.E-02	5.E-02	4.E-02	1.E-05	8.E-06
Beryllium, Total	2.E-03	2.E-04	3.E-03	2.E-04	2.E-03	2.E-04	3.E-03	2.E-04	2.E-03	2.E-04	6.E-07	5.E-08
Cadmium, Total	1.E-01	1.E-02	2.E-01	2.E-02	1.E-01	1.E-02	2.E-01	2.E-02	6.E-01	6.E-02	1.E-05	1.E-06
Chromium, Total	3.E-05	NB	4.E-05	NB	3.E-05	NB	4.E-05	NB	3.E-04	NB	4.E-08	NB
Copper, Total	1.E-01	9.E-02	1.E-01	1.E-01	3.E-01	2.E-01	1.E+00	8.E-01	**2.E+00**	**2.E+00**	7.E-05	5.E-05
Iron	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	1.E-01	1.E-02	2.E-01	2.E-02	1.E-01	1.E-02	2.E-01	2.E-02	7.E-01	7.E-02	4.E-05	4.E-06
Manganese	1.E-02	3.E-03	2.E-02	6.E-03	1.E-02	3.E-03	2.E-02	6.E-03	1.E-02	3.E-03	2.E-06	7.E-07
Mercury	5.E-02	1.E-02	1.E-01	2.E-02	5.E-02	1.E-02	1.E-01	2.E-02	5.E-02	1.E-02	5.E-03	9.E-04
Molybdenum	6.E-02	6.E-03	1.E-01	1.E-02	6.E-02	6.E-03	1.E-01	1.E-02	6.E-02	6.E-03	1.E-05	1.E-06
Nickel, Total	4.E-02	2.E-02	6.E-02	3.E-02	4.E-02	2.E-02	6.E-02	3.E-02	1.E-01	7.E-02	3.E-06	2.E-06
Selenium	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Silver	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Vanadium, Total	5.E-01	5.E-02	7.E-01	7.E-02	5.E-01	5.E-02	7.E-01	7.E-02	5.E-01	5.E-02	1.E-04	1.E-05
Zinc, Total	1.E-01	5.E-02	1.E-01	7.E-02	2.E-01	8.E-02	3.E-01	1.E-01	4.E-01	2.E-01	4.E-04	2.E-04
Total PCBs	1.E-03	6.E-04	2.E-03	9.E-04	1.E-02	7.E-03	1.E-01	5.E-02	2.E-02	1.E-02	6.E-05	3.E-05
Total DDT	1.E-04	2.E-05	1.E-04	3.E-05	1.E-04	2.E-05	1.E-04	3.E-05	1.E-04	2.E-05	2.E-05	3.E-06
Aldrin	2.E-03	4.E-04	2.E-03	4.E-04	2.E-03	4.E-04	2.E-03	4.E-04	6.E-05	1.E-05	1.E-08	3.E-09
Alpha Chlordane	4.E-06	2.E-06	6.E-06	3.E-06	4.E-06	2.E-06	6.E-06	3.E-06	4.E-06	2.E-06	9.E-10	5.E-10
delta-BHC	5.E-05	5.E-06	5.E-05	5.E-06	5.E-05	5.E-06	5.E-05	5.E-06	5.E-05	5.E-06	1.E-08	1.E-09
Dieldrin	1.E-03	1.E-04	1.E-03	1.E-04	1.E-03	1.E-04	1.E-03	1.E-04	1.E-03	1.E-04	3.E-07	3.E-08
Endosulfan I	5.E-05	NB	1.E-04	NB	5.E-05	NB	1.E-04	NB	5.E-05	NB	1.E-08	NB
Endosulfan II	9.E-05	NB	1.E-04	NB	9.E-05	NB	1.E-04	NB	9.E-05	NB	2.E-08	NB
Endosulfan sulfate	5.E-05	NB	5.E-05	NB	5.E-05	NB	5.E-05	NB	5.E-05	NB	1.E-08	NB
Endrin aldehyde	5.E-04	5.E-05	8.E-04	8.E-05	5.E-04	5.E-05	8.E-04	8.E-05	5.E-04	5.E-05	1.E-07	1.E-08
Endrin ketone	4.E-04	4.E-05	6.E-04	6.E-05	4.E-04	4.E-05	6.E-04	6.E-05	4.E-04	4.E-05	9.E-08	9.E-09
Gamma Chlordane	6.E-04	3.E-04	6.E-04	3.E-04	6.E-04	3.E-04	6.E-04	3.E-04	4.E-04	2.E-04	2.E-09	1.E-09
gamma-BHC (Lindane)	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Heptachlor	7.E-03	7.E-04	7.E-03	7.E-04	7.E-03	7.E-04	7.E-03	7.E-04	2.E-05	2.E-06	5.E-09	5.E-10
Heptachlor epoxide	1.E-04	1.E-05	1.E-04	1.E-05	1.E-04	1.E-05	1.E-04	1.E-05	1.E-04	1.E-05	2.E-08	2.E-09
Methoxychlor	1.E-05	5.E-06	2.E-05	8.E-06	1.E-05	5.E-06	2.E-05	8.E-06	1.E-05	5.E-06	2.E-09	1.E-09
Total PAHs	*	*	*	*	*	*	*	*	*	*	*	*
bis(2-ethylhexyl)phthalate	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Di-n-butylphthalate	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	NE	NE	NE	NE
Diethylphthalate	0.E+00	NB	0.E+00	NB	0.E+00	NB	0.E+00	NB	NE	NB	NE	NB
Acenaphthylene	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Fluoranthene	5.E-06	NB	5.E-06	NB	5.E-06	NB	5.E-06	NB	5.E-06	NB	NE	NB
Benzo(b)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(k)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(a)pyrene	1.E-01	1.E-02	1.E-01	1.E-02	1.E-01	1.E-02	1.E-01	1.E-02	NE	NE	NE	NE
Benzo(g,h,i)perylene	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Indeno(1,2,3-c-d)pyrene	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Dibenz(a,h)anthracene	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
Dioxin - TEQ	7.E-01	7.E-02	1.E+00	1.E-01	7.E-01	7.E-02	1.E+00	1.E-01	**3.E+00**	3.E-01	2.E-03	2.E-04

[3] In this scenario, the muskrat was assumed to ingest biota (plants or snails), sediment, and surface water. The snail scenario is based on modeled snail concentrations using site-specific BAFs. The river otter is assumed to ingest fish, sediment, and surface water; the fish concentrations are modeled based on site specific BAFs.

Notes:

NE = Not evaluated (not detected in biota and, therefore, no BAF could be calculated)

NB = Benchmark not available

Average scenario uses area use factors and migration factors where appropriate

Maximum scenario assumes receptor is restricted to site

* PAHs were evaluated as total PAHs for birds, but for individual compounds for mammals

Table 7-20b
Results of Food Chain Modeling
Sauget Area I Borrow Pit Lake

	SCENARIO[1]							
	River Otter–Borrow Pit Fish Ingestion–Average shallow sediment		River Otter–Borrow Pit Fish Ingestion–Maximum shallow sediment		River Otter–Borrow Pit Fish Ingestion–Average combined shallow and deep sediment		River Otter–Borrow Pit Fish Ingestion–Maximum combined shallow and deep sediment	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	9 E-08	2 E-08	9 E-06	2 E-06	9.E-08	2.E-08	9.E-06	2.E-06
2,4-DB	3 E-06	9 E-07	3 E-04	1 E-04	3 E-06	9.E-07	3.E-04	1.E-04
Dicamba	1 E-05	3 E-06	1 E-03	3.E-04	1.E-05	3.E-06	1.E-03	3.E-04
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	5 E-04	2 E-04	6 E-02	2 E-02	5 E-04	2.E-04	6.E-02	2.E-02
MCPP	0 E+00	0 E+00	0.E+00	0 E+00	0.E+00	0.E+00	0.E+00	0.E+00
Pentachlorophenol	6 E-06	6 E-07	6 E-04	6 E-05	6.E-06	6.E-07	6.E-04	6.E-05
Aluminum, Total	2 E-01	2 E-02	2.E+01	2.E+00	2 E-01	2.E-02	2.E+01	2.E+00
Antimony	3 E-04	3 E-05	3 E-02	3 E-03	3.E-04	3.E-05	3.E-02	3.E-03
Arsenic, Total	6 E-05	NB	7 E-03	NB	6.E-05	NB	7.E-03	NB
Barium, Total	2 E-04	2 E-04	3 E-02	2 E-02	2 E-04	2.E-04	3.E-02	2.E-02
Beryllium, Total	7 E-06	6 E-07	8 E-04	7 E-05	7.E-06	6.E-07	8.E-04	7.E-05
Cadmium, Total	2 E-05	2 E-06	2 E-03	2 E-04	2 E-05	2.E-06	2.E-03	2.E-04
Chromium, Total	4 E-07	NB	7 E-05	NB	4 E-07	NB	7.E-05	NB
Copper, Total	1 E-04	1 E-04	2 E-02	2 E-02	1.E-04	1.E-04	4.E-02	3.E-02
Iron	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	1 E-04	1 E-05	2 E-02	2 E-03	1.E-04	1.E-05	2.E-02	2.E-03
Manganese	1.E-04	4 E-05	2 E-02	5.E-03	1.E-04	4.E-05	2.E-02	5.E-03
Mercury	9 E-03	2 E-03	2.E+00	5 E-01	9.E-03	2.E-03	2.E+00	5.E-01
Molybdenum	8 E-05	8 E-06	1 E-02	1 E-03	8.E-05	8.E-06	1.E-02	1.E-03
Nickel, Total	1 E-05	5 E-06	1.E-03	6 E-04	1.E-05	5.E-06	1.E-03	6.E-04
Selenium	4.E-03	3 E-03	7 E-01	4.E-01	4 E-03	3.E-03	7.E-01	4.E-01
Silver	3 E-07	3 E-08	3 E-05	3 E-06	3 E-07	3.E-08	3.E-05	3.E-06
Vanadium, Total	1 E-03	1 E-04	2 E-01	2 E-02	1 E-03	1.E-04	2.E-01	2.E-02
Zinc, Total	3 E-04	2 E-04	4 E-02	2 E-02	3.E-04	2.E-04	4.E-02	2.E-02
Total PCBs	1 E-03	7 E-04	3 E-01	1.E-01	1.E-03	7.E-04	3.E-01	1.E-01
Total DDT	4 E-05	7 E-06	6.E-03	1 E-03	4.E-05	7.E-06	6.E-03	1.E-03
Aldrin	0 E+00	0 E+00	0.E+00	0.E+00	0 E+00	0.0.E+00	0.E+00	0.E+00
Alpha Chlordane	3.E-06	2 E-06	7.E-04	4 E-04	3.E-06	2.E-06	7.E-04	4.E-04
delta-BHC	2 E-07	8 E-08	2 E-05	2 E-06	2 E-07	2.E-08	2.E-05	2.E-06
Dieldrin	3 E-07	2 E-07	3 E-05	3 E-06	3 E-07	3.E-08	3.E-05	3.E-06
Endosulfan I	2 E-07	NB	3 E-05	NB	2.E-07	NB	3.E-05	NB
Endosulfan II	0 E+00	NB	0 E+00	NB	0 E+00	NB	0.E+00	NB
Endosulfan sulfate	4 E-07	NB	6.E-05	NB	4.E-07	NB	6.E-05	NB
Endrin aldehyde	4 E-07	4 E-08	5.E-05	5 E-06	4.E-07	4.E-08	5.E-05	5.E-06
Endrin ketone	2 E-07	2 E-08	2.E-05	2.E-06	2 E-07	2.E-08	2.E-05	2.E-06
Gamma Chlordane	6 E-06	3 E-06	1 E-03	6.E-04	6.E-06	3.E-06	1.E-03	6.E-04
gamma-BHC (Lindane)	6 E-09	6.E-10	6 E-07	6 E-08	6 E-09	6.E-10	6.E-07	6.E-08
Heptachlor	3 E-05	3 E-06	3 E-03	3 E-04	3 E-05	3.E-06	3.E-03	3.E-04
Heptachlor epoxide	3 E-07	3 E-08	3 E-05	3 E-06	3.E-07	3.E-08	3.E-05	3.E-06
Methoxychlor	0 E+00	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00
Total PAHs	*	*	*	*	*	*	*	*
bis(2-ethylhexyl)phthalate	3 E-05	3 E-06	3 E-03	3.E-04	3.E-05	3.E-06	3.E-03	3.E-04
Di-n-butylphthalate	2 E-07	5 E-08	2.E-05	5 E-06	2.E-07	5.E-08	2.E-05	5.E-06
Diethylphthalate	2.E-08	NB	2 E-06	NB	2.E-08	NB	2.E-06	NB
Acenaphthylene	NB	NB	NB	NB	NB	NB	NB	NB
Fluoranthene	0 E+00	NB	0 E+00	NB	0 E+00	NB	0.E+00	NB
Benzo(b)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(k)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(a)pyrene	0 E+00	0 E+00	0.E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00
Benzo(g,h,i)perylene	NB	NB	NB	NB	NB	NB	NB	NB
Indeno(1,2,3-c-d)pyrene	NB	NB	NB	NB	NB	NB	NB	NB
Dibenz(a,h)anthracene	NB	NB	NB	NB	NB	NB	NB	NB
Dioxin - TEQ	5 E-03	5 E-04	8 E-01	8 E-02	5.E-03	5 E-04	8.E-01	8.E-02

[1] In this scenario, the river otter is assumed to ingest fish, sediment, and surface water

Table 7-20b
Results of Food Chain Modeling
Sauget Area I Borrow Pit Lake

	SCENARIO[2]					
	Great Blue Heron--Borrow Pit Fish Ingestion-Average		Great Blue Heron-Borrow Pit Fish Average**		Great Blue Heron--Borrow Pit Fish Ingestion-Maximum	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	NB	NB	NB	NB	NB	NB
2,4-DB	2.E-05	NB	1.E-08	NB	3.E-05	NB
Dicamba	NB	NB	NB	NB	NB	NB
Dichloroprop	NB	NB	NB	NB	NB	NB
MCPA	NB	NB	NB	NB	NB	NB
MCPP	NB	NB	NB	NB	NB	NB
Pentachlorophenol	NB	NB	NB	NB	NB	NB
Aluminum, Total	4.E-02	NB	3.E-05	NB	8.E-02	NB
Antimony	NB	NB	NB	NB	NB	NB
Arsenic, Total	8.E-05	3.E-05	5.E-08	2.E-08	1.E-04	5.E-05
Barium, Total	3.E-04	1.E-04	2.E-07	9.E-08	7.E-04	3.E-04
Beryllium, Total	NB	NB	NB	NB	NB	NB
Cadmium, Total	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Chromium, Total	5.E-02	1.E-02	3.E-05	7.E-06	9.E-02	2.E-02
Copper, Total	3.E-03	2.E-03	2.E-06	1.E-06	6.E-03	4.E-03
Iron	NB	NB	NB	NB	NB	NB
Lead, Total	4.E-02	4.E-03	3.E-05	3.E-06	8.E-02	8.E-03
Manganese	2.E-05	NB	2.E-08	NB	8.E-05	NB
Mercury	**4.E+00**	4.E-01	3.E-03	3.E-04	**1.E+01**	1.E+00
Molybdenum	4.E-05	4.E-06	3.E-08	3.E-09	5.E-05	5.E-06
Nickel, Total	5.E-06	4.E-06	3.E-09	2.E-09	9.E-06	6.E-06
Selenium	1.E-01	6.E-02	8.E-05	4.E-05	2.E-01	1.E-01
Silver	NB	NB	NB	NB	NB	NB
Vanadium, Total	3.E-05	NB	2.E-08	NB	6.E-05	NB
Zinc, Total	2.E-01	3.E-02	2.E-04	2.E-05	4.E-01	4.E-02
Total PCBs	5.E-02	5.E-03	3.E-05	3.E-06	1.E-01	1.E-02
Total DDT	5.E-01	5.E-02	3.E-04	3.E-05	1.E+00	1.E-01
Aldrin	NB	NB	NB	NB	NB	NB
Alpha Chlordane	9.E-05	2.E-05	6.E-08	1.E-08	3.E-04	5.E-05
delta-BHC	1.E-07	3.E-08	9.E-11	2.E-11	2.E-07	4.E-08
Dieldrin	4.E-07	NB	3.E-10	NB	6.E-07	NB
Endosulfan I	8.E-09	NB	5.E-12	NB	1.E-08	NB
Endosulfan II	0.E+00	NB	0.E+00	NB	0.E+00	NB
Endosulfan sulfate	1.E-08	NB	7.E-12	NB	1.E-08	NB
Endrin aldehyde	1.E-05	1.E-06	7.E-09	7.E-10	1.E-05	1.E-06
Endrin ketone	9.E-06	9.E-07	6.E-09	6.E-10	1.E-05	1.E-06
Gamma Chlordane	2.E-04	3.E-05	1.E-07	2.E-08	4.E-04	9.E-05
gamma-BHC (Lindane)	6.E-08	6.E-09	4.E-11	4.E-12	9.E-08	9.E-09
Heptachlor	NB	NB	NB	NB	NB	NB
Heptachlor epoxide	NB	NB	NB	NB	NB	NB
Methoxychlor	NB	NB	NB	NB	NB	NB
Total PAHs	3.E-04	3.E-05	2.E-07	2.E-08	3.E-04	3.E-05
bis(2-ethylhexyl)phthalate	2.E-02	NB	1.E-05	NB	3.E-02	NB
Di-n-butylphthalate	1.E-02	1.E-03	7.E-06	7.E-07	1.E-02	1.E-03
Diethylphthalate	NB	NB	NB	NB	NB	NB
Acenaphthylene	*	*	*	*	*	*
Fluoranthene	*	*	*	*	*	*
Benzo(b)fluoranthene	*	*	*	*	*	*
Benzo(k)fluoranthene	*	*	*	*	*	*
Benzo(a)pyrene	*	*	*	*	*	*
Benzo(g,h,i)perylene	*	*	*	*	*	*
Indeno(1,2,3-c-d)pyrene	*	*	*	*	*	*
Dibenz(a,h)anthracene	*	*	*	*	*	*
Dioxin - TEQ	6.E-02	6.E-03	4.E-05	4.E-06	1.E-01	1.E-02

[2]*The great blue heron is assumed to ingest fish and surface water.*

**Indicates sensitivity analysis using larger foraging area (3 mile radius)

Table 7-20b
Results of Food Chain Modeling
Sauget Area I Borrow Pit Lake

	SCENARIO[1]							
	Female Muskrat–Borrow Pit Clam Ingestion-Average shallow sediment		Female Muskrat–Borrow Pit Clam Ingestion-Maximum shallow sediment		Female Muskrat–Borrow Pit Clam Ingestion-Average combined shallow and deep		Female Muskrat–Borrow Pit Clam Ingestion-Maximum combined shallow and deep sediment	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	3 E-05	6 E-06	3 E-05	6 E-06	3.E-05	6.E-06	3.E-05	6.E-06
2,4-DB	0 E+00	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00
Dicamba	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00	0.E+00
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00	0.E+00
MCPP	6 E-01	2 E-01	6 E-01	2 E-01	6.E-01	2.E-01	6.E-01	2.E-01
Pentachlorophenol	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00	0.E+00
Aluminum, Total	**4.E+01**	**4.E+00**	**5.E+01**	**5.E+00**	**4.E+01**	**4.E+00**	**5.E+01**	**5.E+00**
Antimony	9 E-02	9 E-03	9 E-02	9 E-03	9 E-02	9.E-03	9.E-02	9.E-03
Arsenic, Total	2 E-01	NB	2 E-01	NB	2 E-01	NB	2.E-01	NB
Barium, Total	8 E-02	6.E-02	1 E-01	8 E-02	8 E-02	6.E-02	1.E-01	8.E-02
Beryllium, Total	2 E-03	2 E-04	3 E-03	2 E-04	2 E-03	2 E-04	3 E-03	2 E-04
Cadmium, Total	6 E-02	6 E-03	7 E-02	7 E-03	6 E-02	6.E-03	7.E-02	7.E-03
Chromium, Total	1 E-04	NB	2 E-04	NB	1 E-04	NB	2.E-04	NB
Copper, Total	4 E-02	3 E-02	4 E-02	3 E-02	3 E-02	3.E-02	1.E-01	8.E-02
Iron	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	3 E-02	3 E-03	4 E-02	4 E-03	3 E-02	3.E-03	4.E-02	4.E-03
Manganese	5 E-02	1 E-02	7 E-02	2 E-02	5 E-02	1.E-02	7.E-02	2.E-02
Mercury	1 E-02	2 E-03	1 E-02	3 E-03	1 E-02	2.E-03	1.E-02	3.E-03
Molybdenum	5 E-02	5 E-03	6 E-02	6 E-03	5 E-02	5.E-03	6.E-02	6.E-03
Nickel, Total	4 E-03	2 E-03	4 E-03	2 E-03	4.E-03	2.E-03	4.E-03	2.E-03
Selenium	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00	0.E+00
Silver	4 E-04	4 E-05	4 E-04	4 E-05	4.E-04	4.E-05	4.E-04	4.E-05
Vanadium, Total	5 E-01	5 E-02	6 E-01	6 E-02	5 E-01	5 E-02	6.E-01	6.E-02
Zinc, Total	5 E-02	2 E-02	7 E-02	4 E-02	5 E-02	3.E-02	1.E-01	5.E-02
Total PCBs	0 E+00	0 E+00	0 E+00	0 E+00	8 E-04	4.E-04	1.E-02	5.E-03
Total DDT	2 E-05	4 E-06	4 E-05	9 E-06	2 E-05	4.E-06	4.E-05	9.E-06
Aldrin	0 E+00	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00
Alpha Chlordane	2 E-06	9 E-07	4 E-06	2 E-06	2 E-06	9.E-07	4.E-06	2.E-06
delta-BHC	2 E-04	2 E-05	2 E-04	2 E-05	2 E-04	2.E-05	2.E-04	2.E-05
Dieldrin	1 E-04	1 E-05	1 E-04	1 E-05	1 E-04	1.E-05	1.E-04	1.E-05
Endosulfan I	7 E-05	NB	1 E-04	NB	7 E-05	NB	1.E-04	NB
Endosulfan II	0 E+00	NB	0 E+00	NB	0.E+00	NB	0.E+00	NB
Endosulfan sulfate	1 E-04	NB	2 E-04	NB	1 E-04	NB	2.E-04	NB
Endrin aldehyde	2 E-04	2 E-05	2 E-04	2 E-05	2.E-04	2.E-05	2.E-04	2.E-05
Endrin ketone	1 E-04	1 E-05	1 E-04	1 E-05	1 E-04	1.E-05	1.E-04	1.E-05
Gamma Chlordane	3 E-06	2 E-06	3 E-06	2 E-06	3 E-06	2.E-06	3.E-06	2.E-06
gamma-BHC (Lindane)	2 E-06	2 E-07	2 E-06	2 E-07	2 E-06	2.E-07	2.E-06	2.E-07
Heptachlor	8 E-03	8 E-04	8 E-03	8 E-04	8 E-03	8.E-04	8.E-03	8.E-04
Heptachlor epoxide	1 E-04	1 E-05	1 E-04	1 E-05	1 E-04	1.E-05	1.E-04	1.E-05
Methoxychlor	6 E-04	3 E-04	6 E-04	3 E-04	6 E-04	3.E-04	6.E-04	3.E-04
Total PAHs	•	•	•	•	•	•	•	•
bis(2-ethylhexyl)phthalate	5 E-03	5 E-04	8 E-03	8 E-04	5 E-03	5.E-04	8.E-03	8.E-04
Di-n-butylphthalate	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00	0.E+00
Diethylphthalate	1 E-05	NB	2 E-05	NB	1 E-05	NB	2.E-05	NB
Acenaphthylene	NB	NB	NB	NB	NB	NB	NB	NB
Fluoranthene	0 E+00	NB	0 E+00	NB	0.E+00	NB	0.E+00	NB
Benzo(b)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(k)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(a)pyrene	0 E+00	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00
Benzo(g,h,i)perylene	NB	NB	NB	NB	NB	NB	NB	NB
Indeno(1,2,3-c-d)pyrene	NB	NB	NB	NB	NB	NB	NB	NB
Dibenz(a,h)anthracene	NB	NB	NB	NB	NB	NB	NB	NB
Dioxin - TEQ	1 E-01	1 E-02	2 E-01	2 E-02	1.E-01	1.E-02	2.E-01	2.E-02

[1]The muskrat is assumed to ingest clams, sediment, and surface water.

Table 7-20b
Results of Food Chain Modeling
Sauget Area I Borrow Pit Lake

	SCENARIO[4]							
	River Otter--Borrow Pit Clam Ingestion--Average shallow sediment		River Otter--Borrow Pit Clam Ingestion-Maximum shallow sediment		River Otter--Borrow Pit Clam Ingestion--Average combined shallow and deep sediment		River Otter--Borrow Pit Clam Ingestion-Maximum combined shallow and deep sediment	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	9.E-08	2.E-08	9.E-06	2.E-06	9.E-08	2.E-08	9.E-06	2.E-06
2,4-DB	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Dicamba	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
MCPP	3.E-03	1.E-03	3.E-01	1.E-01	3.E-03	1.E-03	3.E-01	1.E-01
Pentachlorophenol	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Aluminum, Total	1.E-01	1.E-02	**2.E+01**	**2.E+00**	1.E-01	1.E-02	**2.E+01**	**2.E+00**
Antimony	3.E-04	3.E-05	3.E-02	3.E-03	3.E-04	3.E-05	3.E-02	3.E-03
Arsenic, Total	9.E-04	NB	9.E-02	NB	9.E-04	NB	9.E-02	NB
Barium, Total	2.E-04	2.E-04	3.E-02	2.E-02	2.E-04	2.E-04	3.E-02	2.E-02
Beryllium, Total	7.E-06	6.E-07	8.E-04	7.E-05	7.E-06	6.E-07	8.E-04	7.E-05
Cadmium, Total	3.E-04	3.E-05	3.E-02	3.E-03	3.E-04	3.E-05	3.E-02	3.E-03
Chromium, Total	6.E-07	NB	9.E-05	NB	6.E-07	NB	9.E-05	NB
Copper, Total	1.E-04	1.E-04	2.E-02	1.E-02	1.E-04	1.E-04	3.E-02	3.E-02
Iron	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	1.E-04	1.E-05	1.E-02	1.E-03	1.E-04	1.E-05	1.E-02	1.E-03
Manganese	1.E-04	4.E-05	2.E-02	5.E-03	1.E-04	4.E-05	2.E-02	5.E-03
Mercury	3.E-05	7.E-06	4.E-03	9.E-04	3.E-05	7.E-06	4.E-03	9.E-04
Molybdenum	8.E-05	8.E-06	1.E-02	1.E-03	8.E-05	8.E-06	1.E-02	1.E-03
Nickel, Total	1.E-05	5.E-06	1.E-03	6.E-04	1.E-05	5.E-06	1.E-03	6.E-04
Selenium	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Silver	2.E-06	2.E-07	2.E-04	2.E-05	2.E-06	2.E-07	2.E-04	2.E-05
Vanadium, Total	1.E-03	1.E-04	2.E-01	2.E-02	1.E-03	1.E-04	2.E-01	2.E-02
Zinc, Total	2.E-04	1.E-04	3.E-02	2.E-02	2.E-04	1.E-04	4.E-02	2.E-02
Total PCBs	0.E+00	0.E+00	0.E+00	0.E+00	3.E-06	1.E-06	3.E-03	2.E-03
Total DDT	6.E-08	1.E-08	1.E-05	3.E-06	6.E-08	1.E-08	1.E-05	3.E-06
Aldrin	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Alpha Chlordane	5.E-09	3.E-09	1.E-06	6.E-07	5.E-09	3.E-09	1.E-06	6.E-07
delta-BHC	2.E-07	2.E-08	2.E-05	2.E-06	2.E-07	2.E-08	2.E-05	2.E-06
Dieldrin	3.E-07	3.E-08	3.E-05	3.E-06	3.E-07	3.E-08	3.E-05	3.E-06
Endosulfan I	2.E-07	NB	3.E-05	NB	2.E-07	NB	3.E-05	NB
Endosulfan II	0.E+00	NB	0.E+00	NB	0.E+00	NB	0.E+00	NB
Endosulfan sulfate	4.E-07	NB	6.E-05	NB	4.E-07	NB	6.E-05	NB
Endrin aldehyde	4.E-07	4.E-08	5.E-05	5.E-06	4.E-07	4.E-08	5.E-05	5.E-06
Endrin ketone	2.E-07	2.E-08	2.E-05	2.E-06	2.E-07	2.E-08	2.E-05	2.E-06
Gamma Chlordane	9.E-09	5.E-09	1.E-06	5.E-07	9.E-09	5.E-09	1.E-06	5.E-07
gamma-BHC (Lindane)	6.E-09	6.E-10	6.E-07	6.E-08	6.E-09	6.E-10	6.E-07	6.E-08
Heptachlor	4.E-05	4.E-06	4.E-03	4.E-04	4.E-05	4.E-06	4.E-03	4.E-04
Heptachlor epoxide	3.E-07	3.E-08	3.E-05	3.E-06	3.E-07	3.E-08	3.E-05	3.E-06
Methoxychlor	3.E-06	1.E-06	3.E-04	1.E-04	3.E-06	1.E-06	3.E-04	1.E-04
Total PAHs	*	*	*	*	*	*	*	*
bis(2-ethylhexyl)phthalate	2.E-05	2.E-06	4.E-03	4.E-04	2.E-05	2.E-06	4.E-03	4.E-04
Di-n-butylphthalate	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Diethylphthalate	7.E-08	NB	1.E-05	NB	7.E-08	NB	1.E-05	NB
Acenaphthylene	NB	NB	NB	NB	NB	NB	NB	NB
Fluoranthene	0.E+00	NB	0.E+00	NB	NB	0.E+00	NB	0.E+00	NB
Benzo(b)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(k)fluoranthene	NB	NB	NB	NB	NB	NB	NB	NB
Benzo(a)pyrene	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
Benzo(g,h,i)perylene	NB	NB	NB	NB	NB	NB	NB	NB
Indeno(1,2,3-c-d)pyrene	NB	NB	NB	NB	NB	NB	NB	NB
Dibenz(a,h)anthracene	NB	NB	NB	NB	NB	NB	NB	NB
Dioxin - TEQ	4.E-04	4.E-05	6.E-02	6.E-03	4.E-04	4.E-05	6.E-02	6.E-03

[4]In this scenario, the river otter is assumed to ingest clams, sediment, and surface water.

Table 7-20b
Results of Food Chain Modeling
Sauget Area I Borrow Pit Lake

	SCENARIO[5]							
	Mallard Duck–Borrow Pit Shrimp Ingestion-Average shallow sediment		Mallad Duck–Borrow Pit Shrimp Ingestion-Maximum shallow sediment		Mallard Duck–Borrow Pit Shrimp Ingestion-Average combined shallow and deep sediment		Mallad Duck–Borrow Pit Shrimp Ingestion-Maximum combined shallow and deep sediment	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	NB	NB	NB	NB	NB	NB	NB	NB
2,4-DB	0 E+00	NB	0 E+00	NB	0 E+00	NB	0.E+00	NB
Dicamba	NB	NB	NB	NB	NB	NB	NB	NB
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	NB	NB	NB	NB	NB	NB	NB	NB
MCPP	NB	NB	NB	NB	NB	NB	NB	NB
Pentachlorophenol	NB	NB	NB	NB	NB	NB	NB	NB
Aluminum, Total	2 E-03	NB	3.E-01	NB	2 E-03	NB	3.E-01	NB
Antimony	NB	NB	NB	NB	NB	NB	NB	NB
Arsenic, Total	4 E-05	2 E-05	5 E-03	2 E-03	4 E-05	2 E-05	5.E-03	2.E-03
Barium, Total	2 E-04	1.E-04	3.E-02	2 E-02	2 E-04	1.E-04	3.E-02	2.E-02
Beryllium, Total	NB	NB	NB	NB	NB	NB	NB	NB
Cadmium, Total	2 E-05	1 E-06	3 E-03	2 E-04	2 E-05	1 E-06	3.E-03	2.E-04
Chromium, Total	1 E-03	2 E-04	1.E-01	3 E-02	1 E-03	2.E-04	1.E-01	3.E-02
Copper, Total	6 E-04	4 E-04	7.E-02	6 E-02	6 E-04	4.E-04	8.E-02	6.E-02
Iron	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	2 E-03	2 E-04	2.E-01	2 E-02	2 E-03	2.E-04	2.E-01	2.E-02
Manganese	2 E-05	NB	2 E-03	NB	2 E-05	NB	2.E-03	NB
Mercury	2 E-04	2 E-05	4.E-02	4 E-03	2 E-04	2 E-05	4.E-02	4.E-03
Molybdenum	3 E-06	3 E-07	5 E-04	5 E-05	3 E-06	3.E-07	5.E-04	5.E-05
Nickel, Total	8 E-06	6 E-06	1 E-03	8 E-04	8.E-06	6.E-06	1.E-03	8.E-04
Selenium	0 E+00	0 E+00	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00
Silver	NB	NB	NB	NB	NB	NB	NB	NB
Vanadium, Total	4 E-05	NB	6 E-03	NB	4.E-05	NB	6.E-03	NB
Zinc, Total	4 E-03	4 E-04	5 E-01	5 E-02	4.E-03	4.E-04	7.E-01	7.E-02
Total PCBs	0 E+00	0 E+00	0 E+00	0 E+00	4 E-06	4 E-07	6.E-03	6.E-04
Total DDT	3 E-05	3 E-06	7 E-03	7 E-04	3 E-05	3.E-06	7.E-03	7.E-04
Aldrin	NB	NB	NB	NB	NB	NB	NB	NB
Alpha Chlordane	1 E-08	2 E-09	2 E-06	5 E-07	1.E-08	2.E-09	2.E-06	5.E-07
delta-BHC	2 E-09	4 E-10	2 E-07	6 E-08	2 E-09	4.E-10	2.E-07	6.E-08
Dieldrin	9 E-08	NB	1.E-05	NB	9 E-08	NB	1.E-05	NB
Endosulfan I	4 E-09	NB	8 E-07	NB	4 E-09	NB	8.E-07	NB
Endosulfan II	0 E+00	NB	0 E+00	NB	0 E+00	NB	0.E+00	NB
Endosulfan sulfate	9 E-09	NB	2 E-06	NB	9.E-09	NB	2.E-06	NB
Endrin aldehyde	2 E-06	2.E-07	4 E-04	4 E-05	2.E-06	2.E-07	4.E-04	4.E-05
Endrin ketone	1 E-06	1 E-07	1.E-04	1 E-05	1.E-06	1.E-07	1.E-04	1.E-05
Gamma Chlordane	2 E-08	3 E-09	2 E-06	4 E-07	2 E-08	3.E-09	2.E-06	4.E-07
gamma-BHC (Lindane)	3 E-08	3 E-09	4 E-06	4 E-07	3 E-08	3.E-09	4.E-06	4.E-07
Heptachlor	NB	NB	NB	NB	NB	NB	NB	NB
Heptachlor epoxide	NB	NB	NB	NB	NB	NB	NB	NB
Methoxychlor	NB	NB	NB	NB	NB	NB	NB	NB
Total PAHs	0 E+00	0 E+00	0 E+00	0 E+00	0 E+00	0.E+00	0.E+00	0.E+00
bis(2-ethylhexyl)phthalate	0 E+00	NB	0 E+00	NB	0 E+00	NB	0.E+00	NB
Di-n-butylphthalate	0 E+00	0 E+00	0.E+00	0 E+00	0.E+00	0.E+00	0.E+00	0.E+00
Diethylphthalate	NB	NB	NB	NB	NB	NB	NB	NB
Acenaphthylene	*	*	*	*	*	*	*	*
Fluoranthene	*	*	*	*	*	*	*	*
Benzo(b)fluoranthene	*	*	*	*	*	*	*	*
Benzo(k)fluoranthene	*	*	*	*	*	*	*	*
Benzo(a)pyrene	*	*	*	*	*	*	*	*
Benzo(g,h,i)perylene	*	*	*	*	*	*	*	*
Indeno(1,2,3-c-d)pyrene	*	*	*	*	*	*	*	*
Dibenz(a,h)anthracene	*	*	*	*	*	*	*	*
Dioxin - TEQ	4 E-04	4 E-05	5 E-02	5 E-03	4 E-04	4 E-05	5.E-02	5.E-03

[5] In this scenario, the mallard is assumed to ingest shrimp, sediment, and surface water

Table 7-20b
Results of Food Chain Modeling
Sauget Area I Borrow Pit Lake

	SCENARIO[6,7]							
	Tree Swallow--Borrow Pit Insect Ingestion-Average shallow sediment		Tree Swallow--Insect Ingestion-Average combined shallow and deep sediment		Bald Eagle--Borrow Pit Fish Ingestion-Average		Bald Eagle--Borrow Pit Fish Ingestion--Maximum	
Compound	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index	NOAEL Hazard Index	LOAEL Hazard Index
2,4-D	NB	NB	NB	NB	NB	NB	NB	NB
2,4-DB	0.E+00	NB	0.E+00	NB	0.E+00	NB	0.E+00	NB
Dicamba	NB	NB	NB	NB	NB	NB	NB	NB
Dichloroprop	NB	NB	NB	NB	NB	NB	NB	NB
MCPA	NB	NB	NB	NB	NB	NB	NB	NB
MCPP	NB	NB	NB	NB	NB	NB	NB	NB
Pentachlorophenol	NB	NB	NB	NB	NB	NB	NB	NB
Aluminum, Total	**3.E+00**	NB	**3.E+00**	NB	3.E-05	NB	4.E-02	NB
Antimony	NB	NB	NB	NB	NB	NB	NB	NB
Arsenic, Total	5.E-02	2.E-02	5.E-02	2.E-02	1.E-07	5.E-08	1.E-04	4.E-05
Barium, Total	1.E-03	6.E-04	1.E-03	6.E-04	4.E-07	2.E-07	6.E-04	3.E-04
Beryllium, Total	NB	NB	NB	NB	NB	NB	NB	NB
Cadmium, Total	5.E-01	4.E-02	5.E-01	4.E-02	0.E+00	0.E+00	0.E+00	0.E+00
Chromium, Total	**2.E+00**	4.E-01	**2.E+00**	4.E-01	1.E-04	2.E-05	1.E-01	2.E-02
Copper, Total	3.E-01	2.E-01	3.E-01	2.E-01	3.E-06	2.E-06	2.E-03	2.E-03
Iron	NB	NB	NB	NB	NB	NB	NB	NB
Lead, Total	3.E-01	3.E-02	3.E-01	3.E-02	4.E-05	4.E-06	3.E-02	3.E-03
Manganese	1.E-04	NB	1.E-04	NB	4.E-08	NB	6.E-05	NB
Mercury	**4.E+00**	4.E-01	**4.E+00**	4.E-01	2.E-03	2.E-04	**5.E+00**	5.E-01
Molybdenum	2.E-04	2.E-05	2.E-04	2.E-05	6.E-08	6.E-09	4.E-05	4.E-06
Nickel, Total	2.E-02	2.E-02	2.E-02	2.E-02	8.E-09	6.E-09	7.E-06	5.E-06
Selenium	0.E+00	0.E+00	0.E+00	0.E+00	1.E-04	6.E-05	2.E-01	8.E-02
Silver	NB	NB	NB	NB	NB	NB	NB	NB
Vanadium, Total	1.E-04	NB	1.E-04	NB	5.E-08	NB	5.E-05	NB
Zinc, Total	**3.E+00**	3.E-01	**3.E+00**	3.E-01	2.E-04	3.E-05	2.E-01	2.E-02
Total PCBs	0.E+00	0.E+00	**3.E+01**	**3.E+00**	1.E-04	1.E-05	2.E-01	2.E-02
Total DDT	**3.E+00**	3.E-01	**6.E+00**	6.E-01	1.E-03	1.E-04	1.E+00	1.E-01
Aldrin	NB	NB	NB	NB	NB	NB	NB	NB
Alpha Chlordane	0.E+00	0.E+00	0.E+00	0.E+00	5.E-07	9.E-08	7.E-04	1.E-04
delta-BHC	6.E-07	2.E-07	6.E-07	2.E-07	2.E-10	5.E-11	1.E-07	4.E-08
Dieldrin	2.E-06	NB	2.E-06	NB	7.E-10	NB	5.E-07	NB
Endosulfan I	4.E-08	NB	4.E-08	NB	1.E-11	NB	9.E-09	NB
Endosulfan II	0.E+00	NB	0.E+00	NB	0.E+00	NB	0.E+00	NB
Endosulfan sulfate	2.E-03	NB	4.E-03	NB	2.E-11	NB	1.E-08	NB
Endrin aldehyde	5.E-05	5.E-06	5.E-05	5.E-06	2.E-08	2.E-09	1.E-05	1.E-06
Endrin ketone	4.E-02	4.E-03	8.E-02	8.E-03	1.E-08	1.E-09	1.E-05	1.E-06
Gamma Chlordane	4.E-03	8.E-04	1.E-02	2.E-03	8.E-07	2.E-07	1.E-03	2.E-04
gamma-BHC (Lindane)	3.E-07	3.E-08	3.E-07	3.E-08	1.E-10	1.E-11	7.E-08	7.E-09
Heptachlor	NB	NB	NB	NB	NB	NB	NB	NB
Heptachlor epoxide	NB	NB	NB	NB	NB	NB	NB	NB
Methoxychlor	NB	NB	NB	NB	NB	NB	NB	NB
Total PAHs	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
bis(2-ethylhexyl)phthalate	0.E+00	NB	0.E+00	NB	1.E-05	NB	1.E-02	NB
Di-n-butylphthalate	0.E+00	0.E+00	0.E+00	0.E+00	5.E-05	5.E-06	3.E-02	3.E-03
Diethylphthalate	NB	NB	NB	NB	NB	NB	NB	NB
Acenaphthylene	*	*	*	*	*	*	*	*
Fluoranthene	*	*	*	*	*	*	*	*
Benzo(b)fluoranthene	*	*	*	*	*	*	*	*
Benzo(k)fluoranthene	*	*	*	*	*	*	*	*
Benzo(a)pyrene	*	*	*	*	*	*	*	*
Benzo(g,h,i)perylene	*	*	*	*	*	*	*	*
Indeno(1,2,3-c-d)pyrene	*	*	*	*	*	*	*	*
Dibenz(a,h)anthracene	*	*	*	*	*	*	*	*
Dioxin - TEQ	1.E+00	1.E-01	**3.E+00**	3.E-01	1.E-04	1.E-05	1.E-01	1.E-02

[6]The tree swallow is assumed to ingest insects and surface water. Insect concentrations were modeled using site-specific BAFs, literature BSAFs, and literature regression equations.
[7]The bald eagle is assumed to ingest fish and surface water.

Notes:
NB = Benchmark not available
Average scenario uses area use factors and migration factors where appropriate
Maximum scenario assumes receptor is restricted to site
Bolded values indicate a Hazard Index greater than 1
*PAHs were evaluated as total PAHs for birds, but as individual compounds for mammals

Table 7-21
Comparison of Surface Water Concentrations in Dead Creek Section F to Wildlife Benchmarks
Sauget Area I

Sample ID: / Compounds	SW-CSF-S1 Concentration	ER Q	SW-CSF-S2 Concentration	ER Q	SW-CSF-S3 Concentration	ER Q	NOAEL-Based Benchmarks [1] Water	Endpoint Species
Metals (mg/l)								
Aluminum	0.039	J	0.15	J	0.55		4.474	Whitetail deer
Arsenic	0.01	U	0.0032	J	0.0049	J	0.292	Whitetail deer
Barium	0.13		0.13		0.12		23.1	Whitetail deer
Copper	0.0016	J	0.002	J	0.012	J	65.2	Whitetail deer
Iron	0.5		0.55		1		NA	
Lead	0.005	U	0.0022	J	0.0037	J	4.86	Rough-winged Swallow
Manganese	0.082	J	0.1	J	0.14	J	377	Whitetail deer
Molybdenum	0.01	U	0.01	U	0.0028	J	0.6	Whitetail deer
Nickel	0.0069	J	0.013	J	0.021	J	171.36	Whitetail deer
Zinc	0.0073	J	0.035		0.075		62.3	Rough-winged Swallow
SVOC (ug/l)								
Fluoranthene	0.7	J	10	U	10	U	NA	
Dioxins (ug/l)								
2,3,7,8-TCDD TEQ Mammal	9.01197E-06		1.5012E-06		1.5583E-06		0.0007	Little Brown Bat
2,3,7,8-TCDD TEQ Bird	8.92962E-06		8.784E-07		9.922E-07		0.0602	Rough-winged swallow

Only COPCs detected in surface water in Dead Creek Sector F were included in this table.

[1] Sample, BE, DM Opresko, GW Suter. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision.* Prepared for U.S. Department of Energy. Oak Ridge National Laboratory. June 1996. ES/ER/TM-86/R3.

NA = Benchmark not available

Table 7-22
Comparison of Surface Water Concentrations in the Borrow Pit Lake to Wildlife Benchmarks
Sauget Area I

Sample ID: Compounds	SW-BPL-S1 Concentration	ER Q	SW-BPL-S2 Concentration	ER Q	SW-BPL-S3 Concentration	ER Q	NOAEL-Based Benchmarks [1] Water	Endpoint Species
Metals (mg/l)								
Aluminum	3.4		0.71		0.65		4.474	Whitetail deer
Arsenic	0.015		0.0079	J	0.012		0.292	Whitetail deer
Barium	0.32		0.12		0.045		23.1	Whitetail deer
Chromium	0.0041	J	0.01	U	0.01	U	4.3	Rough-winged Swallow
Copper	0.0074	J	0.0036	J	0.0048	J	65.2	Whitetail deer
Iron	8.7	J	1.6	J	1.3	J	NA	
Lead	0.02		0.002	J	0.0029	J	4.86	Rough-winged Swallow
Manganese	1.7		0.13		0.17		377	Whitetail deer
Molybdenum	0.0035	J	0.01	U	0.004	J	0.6	Whitetail deer
Nickel	0.015	J	0.012	J	0.0077	J	171.36	Whitetail deer
Zinc	0.048		0.027		0.017	J	62.3	Rough-winged Swallow
Pesticides (ug/l)								
delta-BHC	0.00013	J	0.0022	J	0.012	U	100 [2]	River Otter
Dieldrin	0.1	U	0.1	U	0.001	J	86	Whitetail deer
Endosulfan I	0.0024	J	0.05	U	0.0015	J	640 [a]	Whitetail deer
Endosulfan sulfate	0.1	U	0.1	U	0.0032	J	640 [a]	Whitetail deer
Endrin	0.1	U	0.1	U	0.00095	J	43 [b]	Rough-winged Swallow
Endrin aldehyde	0.0032	J	0.1	U	0.0016	J	43 [b]	Rough-winged Swallow
Endrin ketone	0.1	U	0.1	U	0.0027	J	43 [b]	Rough-winged Swallow
gamma-BHC (Lindane)	0.019	U	0.0038	J	0.0024	J	8590	Rough-winged Swallow
Heptachlor	0.0026	J	0.0022	J	0.0029	J	557	Whitetail deer
Heptachlor epoxide	0.00096	J	0.0009	J	0.05	U	557 [c]	Whitetail deer
SVOC (ug/l)								
Dioxins (ug/l)								
2,3,7,8-TCDD TEQ Mammal [3]	8.5902E-07		7.453E-07		4.8413E-07		0.0007	Little Brown Bat
2,3,7,8-TCDD TEQ Bird [3]	3.4692E-07		3.475E-07		2.8163E-07		0.0602	Rough-winged swallow

Only COPCs detected in surface water in the Borrow Pit are included in this table.
NA = Benchmark not available
[1] Sample, BE, DM Opresko, GW Suter. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Prepared for U.S. Department of Energy. Oak Ridge National Laboratory. June 1996. ES/ER/TM-86/R3
[2] Value represents BHC-mixed isomers
[3] Mammal and bird TEQ values were calculated for 2,3,7,8-TCDD
[a] Value for Endosulfan was used
[b] Value for Endrin was used
[c] Value for Heptachlor was used

Table 7-23
Shrimp Concentrations in the Borrow Pit Lake and both Reference Areas
Sauget Area I

Compound	Site Concentration	Reference Maximum	Reference Average
Herbicides (ug/kg)			
2,4-D	ND	ND	ND
2,4-DB	ND	ND	ND
Dicamba	ND	ND	ND
Dichloroprop	ND	ND	ND
MCPA	ND	ND	ND
MCPP	ND	4400	2700
Pentachlorophenol	1.8	3.9	2.7
Metals (mg/kg)			
Aluminum, Total	28	100	80
Antimony	**0.16**	**ND**	**ND**
Arsenic, Total	ND	1.2	1.1
Barium, Total	ND	ND	ND
Cadmium, Total	ND	ND	ND
Chromium, Total	0.23	0.28	0.27
Copper, Total	8.3	16	12
Iron	ND	ND	ND
Lead, Total	0.39	0.61	0.50
Manganese	ND	ND	ND
Mercury	ND	ND	ND
Molybdenum	ND	ND	ND
Nickel, Total	ND	ND	ND
Selenium	ND	0.61	0.54
Silver	**0.090**	**0.062**	**0.06**
Zinc, Total	16	17	16
Total PCBs (ug/kg)	ND	ND	ND
Pesticides (ug/kg)			
4,4'-DDD	ND	ND	ND
4,4'-DDE	ND	ND	ND
4,4'-DDT	ND	ND	ND
Aldrin	ND	ND	ND
Alpha Chlordane	ND	ND	ND
delta-BHC	ND	ND	ND
Dieldrin	ND	ND	ND
Endosulfan I	ND	ND	ND
Endosulfan II	ND	ND	ND
Endosulfan sulfate	ND	ND	ND
Endrin aldehyde	ND	ND	ND
Endrin ketone	ND	ND	ND
Gamma Chlordane	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	ND
Heptachlor	ND	ND	ND
Heptachlor epoxide	ND	ND	ND
Methoxychlor	ND	ND	ND
SVOC (ug/kg)			
bis(2-ethylhexyl)phthalate	ND	98	95
Di-n-butylphthalate	ND	ND	ND
Diethylphthalate	44	59	58
Acenaphthylene	ND	ND	ND
Fluoranthene	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND
Indeno(1,2,3-c-d)pyrene	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	ND
2,3,7,8-TCDD TEQ Mammal	0.000218	9.61E-05	6.44E-05
2,3,7,8-TCDD TEQ Bird	0.00172	7.45E-05	4.86E-05

Table 7-24
Clam Concentrations in the Borrow Pit Lake and both Reference Areas
Sauget Area I

Compound	Site Maximum	Site Average	Reference Maximum	Reference Average
Herbicides (ug/kg)				
2,4-D	ND	ND	ND	ND
2,4-DB	ND	ND	ND	ND
Dicamba	ND	ND	ND	ND
Dichloroprop	32	18	87	35
MCPA	ND	ND	1400	7467
MCPP	**4000**	**5000**	**ND**	**ND**
Pentachlorophenol	ND	ND	ND	ND
Metals (mg/kg)				
Aluminum, Total	13	10.5	26	18.33
Antimony	ND	ND	ND	ND
Arsenic, Total	**0.96**	**1.8**	**0.65**	**1.75**
Barium, Total	ND	ND	ND	ND
Cadmium, Total	0.12	0.14	0.61	0.43
Chromium, Total	1.1	0.68	2.2	1.50
Copper, Total	0.99	0.86	2.4	2.13
Iron	ND	ND	ND	ND
Lead, Total	0.25	0.23	0.59	0.42
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Molybdenum	ND	ND	ND	ND
Nickel, Total	ND	ND	ND	ND
Selenium	ND	ND	0.48	0.31
Silver	**0.015**	**0.035**	**ND**	**ND**
Zinc, Total	22	15.0	52	36
Total PCBs (ug/kg)	ND	ND	ND	ND
Pesticides (ug/kg)				
4,4'-DDD	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND
Alpha Chlordane	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND
Gamma Chlordane	ND	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	ND	ND
Heptachlor	**2.3**	**3.55**	**ND**	**ND**
Heptachlor epoxide	ND	ND	ND	ND
Methoxychlor	**5.4**	**30**	**ND**	**ND**
SVOC (ug/kg)				
bis(2-ethylhexyl)phthalate	**170**	**99**	**ND**	**ND**
Di-n-butylphthalate	ND	ND	ND	ND
Diethylphthalate	**120**	**75**	**ND**	**ND**
Acenaphthylene	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND
Indeno(1,2,3-c-d)pyrene	ND	ND	ND	ND
Dibenz(a,h)anthracene	ND	ND	ND	ND
2,3,7,8-TCDD TEQ Mammal	0.000146	8.3E-05	3.64E-05	2.44E-05
2,3,7,8-TCDD TEQ Bird	0.001303	0.000761	0.00025	0.00017

Table 7-25
Comparison of Floodplain Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Dioxins, ug/kg							
2,3,7,8-TCDD TEQ (mammals)[2]	100%	0.052	0.011	yes	0.124	0.00315	Maximum exceeds benchmark
Herbicides, ug/kg							
2,4-D	2%	9.60	NC	no	ND		Frequency less than 5%
2,4-DB	6%	41.00	6.62	yes	ND		No benchmark; ND in background
Dicamba	23%	23.00	4.90	yes	ND		No benchmark; ND in background
MCPA	20%	7400	1784	yes	14500		No benchmark; within background
MCPP	15%	7700	1859	yes	9967		No benchmark; within background
Metals, mg/kg							
Aluminum	100%	18000	10122	yes	25400		No benchmark; within background
Antimony	42%	2.60	1.24	yes	3.80	5	Maximum less than benchmark
Arsenic	100%	34.00	7.88	yes	19.13	9.9	Maximum exceeds benchmark
Barium	100%	1200	198	yes	363	283	Maximum exceeds benchmark
Beryllium	85%	1.10	0.62	yes	1.51	10	Maximum less than benchmark
Cadmium	100%	8.40	2.77	yes	8.65	4	Maximum exceeds benchmark
Calcium	100%	250000	30365	yes	33533		Low toxicity
Chromium	100%	49.00	17.93	yes	39		No benchmark; within background
Cobalt	100%	11.00	7.01	yes	16	20	Maximum less than benchmark
Copper	100%	230	80.94	yes	209	60	Maximum exceeds benchmark
Iron	100%	25000	16348	yes	38000		No benchmark; within background
Lead	100%	260	78.92	yes	185	40.5	Maximum exceeds benchmark
Magnesium	100%	21000	6448	yes	17233		Low toxicity
Manganese	100%	1200	429	yes	883		No benchmark; within background
Mercury	100%	0.57	0.08	yes	0.18		No benchmark; within background
Molybdenum	98%	3.20	0.81	yes	2.02	2	Maximum exceeds benchmark
Nickel	100%	55	20.02	yes	42.67	30	Maximum exceeds benchmark
Potassium	100%	3800	2135	yes	4733		Low toxicity
Selenium	25%	3.20	0.66	yes	ND	0.21	Maximum exceeds benchmark
Silver	49%	0.60	0.49	yes	1.35	2	Maximum less than benchmark
Thallium	26%	1.40	0.68	yes	ND	1	Maximum exceeds benchmark
Vanadium	100%	120	29.91	yes	69	2	Maximum exceeds benchmark
Zinc	100%	1400	332	yes	808	8.5	Maximum exceeds benchmark
PCBs, ug/kg							
Total PCBs	82%	385	90.43	yes	1200	371	Maximum exceeds benchmark
Pesticides, ug/kg							
4,4'-DDD	8%	36	3.01	yes	ND		No benchmark; ND in background
4,4'-DDE	54%	54	4..04	yes	16.12		No benchmark; within background
4,4'-DDT	48%	140	7.95	yes	14.12		No benchmark; within background
Aldrin	2%	23	1.68	yes	ND		Frequency less than 5%
Alpha Chlordane	20%	54	2.55	yes	ND		No benchmark; ND in background
alpha-BHC	2%	0.22	NC	no	ND		Frequency less than 5%
beta-BHC	11%	3.80	0.54	yes	ND		No benchmark; ND in background
delta-BHC	8%	0.24	0.22	yes	ND		No benchmark; ND in background
Dieldrin	29%	120	3.86	yes	ND		No benchmark; ND in background
Endosulfan II	2%	1.00	NC	no	ND		Frequency less than 5%
Endosulfan sulfate	18%	1.90	1.60	yes	ND		No benchmark; ND in background
Endrin	6%	6.10	2.31	yes	ND		No benchmark; ND in background
Endrin aldehyde	5%	5.06	2.16	yes	ND		No benchmark; ND in background
Endrin ketone	37%	4.9450	2.56	yes	ND		No benchmark; ND in background

Table 7-25
Comparison of Floodplain Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Gamma Chlordane	22%	78.00	3.26	yes	ND		No benchmark; ND in background
gamma-BHC (Lindane)	3%	0.1300	NC	no	ND		Frequency less than 5%
Heptachlor	6%	91	1.98	yes	ND		No benchmark; ND in background
Heptachlor epoxide	25%	30	2.04	yes	ND		No benchmark; ND in background
Methoxychlor	37%	38	11.61	yes	ND		No benchmark; ND in background
SVOCs, ug/kg							
2-Methylnaphthalene	5%	72	NC	no	ND		No benchmark; ND in background
Acenaphthene	14%	1200	124	yes	ND	20000	Maximum less than benchmark
Acenaphthylene	6%	75	174	no	ND		No benchmark; ND in background
Anthracene	23%	2300	152	yes	160		No benchmark; within background
Benzo(a)anthracene	57%	4300	266	yes	240		No benchmark; higher than background
Benzo(a)pyrene	40%	3600	226	yes	187		No benchmark; higher than background
Benzo(b)fluoranthene	55%	4400	282	yes	179		No benchmark; higher than background
Benzo(g,h,i)perylene	37%	2200	201	yes	127		No benchmark; higher than background
Benzo(k)fluoranthene	40%	3400	249	yes	208		No benchmark; higher than background
bis(2-Ethylhexyl)phthalate	29%	430	111	yes	322		No benchmark; within background
Butylbenzylphthalate	5%	340	103	yes	ND		No benchmark; ND in background
Carbazole	17%	1000	127	yes	64		No benchmark; higher than background
Chrysene	63%	4900	319	yes	273		No benchmark; higher than background
Dibenzo(a,h)anthracene	18%	810	90	yes	ND		No benchmark; ND in background
Dibenzofuran	8%	770	112	yes	ND		No benchmark; ND in background
Diethylphthalate	2%	39	NC	no	187	100000	Frequency less than 5%
Di-n-butylphthalate	15%	170	100	yes	312	200000	Maximum less than benchmark
Fluoranthene	60%	10000	558	yes	502		No benchmark; higher than background
Fluorene	11%	1400	126	yes	ND		No benchmark; ND in background
Indeno(1,2,3-cd)pyrene	28%	2000	195	yes	ND		No benchmark; ND in background
Naphthalene	3%	79	180	no	ND		Frequency less than 5%
Pentachlorophenol	55%	740	278	yes	742	3000	Maximum less than benchmark
Phenanthrene	52%	9200	366	yes	335		No benchmark; higher than background
Pyrene	49%	8500	443	yes	435		No benchmark; higher than background
VOCs, ug/kg							
2-Butanone (MEK)	35%	47.00	20.85	yes	ND		No benchmark; ND in background
2-Hexanone	5%	6.90	8.01	no	33.00		No benchmark; within background
Acetone	49%	670	283	yes	ND		No benchmark; ND in background
Benzene	8%	4.80	2.97	yes	ND		No benchmark; ND in background
Carbon disulfide	5%	4.30	2.98	yes	ND		No benchmark; ND in background
Chlorobenzene	2%	4.00	2.95	yes	ND	40000	Frequency less than 5%
Ethylbenzene	2%	3.00	2.78	yes	ND		Frequency less than 5%
Methylene chloride (Dichloromethane)	5%	2.40	2.36	yes	11.4		No benchmark; within background
Toluene	20%	12.0	3.34	yes	ND	200000	Maximum less than benchmark
Trichloroethene	6%	6.20	3.07	yes	ND		No benchmark; ND in background
Xylenes, Total	2%	4.20	2.99	yes	ND		Frequency less than 5%

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

[2]Calculated according to 1998 World Health Organization guidelines for mammals; Estimated Maximum Potential Concentration treated as non-detects.

Yellow shading indicates maximum site concentration exceeds benchmark.

Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil).

Table 7-26
Floodplain Surface Soil Locations that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Arsenic, mg/kg	Benchmark[1]	9.9	
	Background[2]	19	
	DAS-T4-S2-0-0.5FT	10	
	UAS-T1-S1-0-0.5FT	10	
	UAS-T2-S3-0-0.5FT	10	
	UAS-T7-S1-0-0.5FT	**34**	
Barium, mg/kg	Benchmark[1]	283	
	Background[2]	360	
	UAS-T4-S2-0-0.5FT	**1200**	
Cadmium, mg/kg	Benchmark[1]	4	
	Background[2]	8.6	
	DAS-T5-S3-0-0.5FT	5.7	
	DAS-T6-S1-0-0.5FT	4	
	UAS-T1-S1-0-0.5FT	4.8	
	UAS-T5-S6-0-0.5FT	8.4	
	UAS-T7-S1-0-0.5FT	5.4	
	UAS-T7-S7-0-0.5FT	6.1	
Copper, mg/kg	Benchmark[1]	60	
	Background[2]	190	
	DAS-T1-S1-0-0.5FT	98	J
	DAS-T1-S2-0-0.5FT	85	J
	DAS-T1-S3-0-0.5FT	73	J
	DAS-T2-S1-0-0.5FT	110	J
	DAS-T2-S3-0-0.5FT	94	J
	DAS-T3-S1-0-0.5FT	70	
	DAS-T3-S2-0-0.5FT	72	
	DAS-T3-S3-0-0.5FT	63	
	DAS-T4-S2-0-0.5FT	79	
	DAS-T4-S3-0-0.5FT	64	
	DAS-T5-S1-0-0.5FT	75	
	DAS-T5-S3-0-0.5FT	70	
	UAS-T1-S1-0-0.5FT	150	
	UAS-T1-S2-0-0.5FT	**230**	
	UAS-T1-S3-0-0.5FT	**230**	
	UAS-T1-S4-0-0.5FT	160	
	UAS-T1-S5-0-0.5FT	130	
	UAS-T1-S6-0-0.5FT	86	
	UAS-T1-S7-0-0.5FT	77	
	UAS-T2-S1-0-0.5FT	140	
	UAS-T2-S2-0-0.5FT	77	
	UAS-T2-S3-0-0.5FT	87	
	UAS-T2-S4-0-0.5FT	95	
	UAS-T2-S5-0-0.5FT	69	
	UAS-T2-S6-0-0.5FT	87	
	UAS-T3-S2-0-0.5FT	65	
	UAS-T3-S3-0-0.5FT	52	J
	UAS-T3-S4-0-0.5FT	77	
	UAS-T3-S5-0-0.5FT	79	
	UAS-T3-S7-0-0.5FT	75	
	UAS-T4-S1-0-0.5FT	69	
	UAS-T4-S2-0-0.5FT	180	
	UAS-T4-S7-0-0.5FT	60	
	UAS-T5-S6-0-0.5FT	85	
	UAS-T7-S1-0-0.5FT	130	

Table 7-26
Floodplain Surface Soil Locations that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Lead, mg/kg	Benchmark[1]	40.5	
	Background[2]	180	
	DAS-T1-S1-0-0.5FT	96	J
	DAS-T1-S2-0-0.5FT	50	J
	DAS-T1-S3-0-0.5FT	50	J
	DAS-T2-S1-0-0.5FT	88	J
	DAS-T2-S3-0-0.5FT	76	J
	DAS-T3-S1-0-0.5FT	53	J
	DAS-T3-S2-0-0.5FT	90	J
	DAS-T3-S3-0-0.5FT	53	J
	DAS-T4-S1-0-0.5FT	75	J
	DAS-T4-S2-0-0.5FT	96	J
	DAS-T4-S3-0-0.5FT	50	J
	DAS-T5-S1-0-0.5FT	130	J
	DAS-T5-S3-0-0.5FT	130	J
	DAS-T6-S1-0-0.5FT	110	J
	DAS-T6-S3-0-0.5FT	87	J
	DAS-T7-S2-0-0.5FT	67	J
	UAS-T1-S1-0-0.5FT	93	
	UAS-T1-S2-0-0.5FT	92	
	UAS-T1-S3-0-0.5FT	120	
	UAS-T1-S4-0-0.5FT	73	
	UAS-T1-S5-0-0.5FT	69	
	UAS-T1-S7-0-0.5FT	46	
	UAS-T2-S1-0-0.5FT	79	
	UAS-T2-S2-0-0.5FT	50	
	UAS-T2-S3-0-0.5FT	66	
	UAS-T2-S4-0-0.5FT	72	
	UAS-T2-S5-0-0.5FT	48	
	UAS-T2-S6-0-0.5FT	79	
	UAS-T3-S2-0-0.5FT	63	
	UAS-T3-S4-0-0.5FT	64	
	UAS-T3-S5-0-0.5FT	56	
	UAS-T3-S7-0-0.5FT	51	J
	UAS-T4-S1-0-0.5FT	62	
	UAS-T4-S2-0-0.5FT	**190**	
	UAS-T4-S5-0-0.5FT	83	
	UAS-T4-S6-0-0.5FT	130	
	UAS-T4-S7-0-0.5FT	**260**	
	UAS-T5-S1-0-0.5FT	59	
	UAS-T5-S2-0-0.5FT	50	
	UAS-T5-S3-0-0.5FT	54	
	UAS-T5-S4-0-0.5FT	50	
	UAS-T5-S5-0-0.5FT	45	
	UAS-T5-S6-0-0.5FT	170	
	UAS-T6-S5-0-0.5FT	78	J
	UAS-T7-S1-0-0.5FT	71	J
	UAS-T7-S2-0-0.5FT	41	J
	UAS-T7-S3-0-0.5FT	64	J
	UAS-T7-S5-0-0.5FT	42	J
	UAS-T7-S6-0-0.5FT	72	J
	UAS-T7-S7-0-0.5FT	150	J
Molybdenum, mg/kg	Benchmark[1]	2	
	Background[2]	2	
	UAS-T4-S5-0-0.5FT	**2.3**	
	UAS-T6-S5-0-0.5FT	**3.2**	
Nickel, mg/kg	Benchmark[1]	30	
	Background[2]	43	
	UAS-T7-S1-0-0.5FT	**55**	

Table 7-26
Floodplain Surface Soil Locations that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Selenium, mg/kg	Benchmark[1]	0.21	
	Background[2]	ND	
	DAS-T2-S3-0-0.5FT	**0.55**	J
	DAS-T4-S2-0-0.5FT	**0.88**	J
	UAS-T1-S1-0-0.5FT	**0.81**	J
	UAS-T1-S5-0-0.5FT	**0.72**	J
	UAS-T2-S4-0-0.5FT	**0.61**	J
	UAS-T2-S6-0-0.5FT	**1**	J
	UAS-T3-S5-0-0.5FT	**0.6**	J
	UAS-T3-S7-0-0.5FT	**3.2**	
	UAS-T5-S4-0-0.5FT	**0.48**	J
	UAS-T6-S5-0-0.5FT	**0.68**	J
	UAS-T7-S1-0-0.5FT	**1.1**	
	UAS-T7-S2-0-0.5FT	**0.49**	J
	UAS-T7-S3-0-0.5FT	**0.89**	J
	UAS-T7-S4-0-0.5FT	**0.55**	J
	UAS-T7-S6-0-0.5FT	**1.1**	
	UAS-T7-S7-0-0.5FT	**0.53**	J
Thallium, mg/kg	Benchmark[1]	1	
	Background[2]	ND	
	DAS-T2-S2-0-0.5FT	**1.3**	
	DAS-T3-S2-0-0.5FT	**1.4**	
	DAS-T4-S2-0-0.5FT	**1.1**	J
	DAS-T4-S3-0-0.5FT	**1.1**	J

Table 7-26
Floodplain Surface Soil Locations that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Vanadium, mg/kg	Benchmark[1]	2	
	Background[2]	69	
	DAS-T1-S1-0-0.5FT	19	
	DAS-T1-S2-0-0.5FT	25	
	DAS-T1-S3-0-0.5FT	18	
	DAS-T2-S1-0-0.5FT	24	
	DAS-T2-S2-0-0.5FT	**120**	
	DAS-T2-S3-0-0.5FT	34	
	DAS-T3-S1-0-0.5FT	23	
	DAS-T3-S2-0-0.5FT	25	
	DAS-T3-S3-0-0.5FT	20	
	DAS-T4-S1-0-0.5FT	21	
	DAS-T4-S2-0-0.5FT	35	
	DAS-T4-S3-0-0.5FT	34	J
	DAS-T5-S1-0-0.5FT	19	
	DAS-T5-S2-0-0.5FT	19	
	DAS-T5-S3-0-0.5FT	17	
	DAS-T6-S1-0-0.5FT	22	J
	DAS-T6-S2-0-0.5FT	22	J
	DAS-T6-S3-0-0.5FT	17	J
	DAS-T7-S1-0-0.5FT	25	
	DAS-T7-S2-0-0.5FT	22	
	UAS-T1-S1-0-0.5FT	32	
	UAS-T1-S2-0-0.5FT	35	
	UAS-T1-S3-0-0.5FT	41	
	UAS-T1-S4-0-0.5FT	36	
	UAS-T1-S5-0-0.5FT	35	
	UAS-T1-S6-0-0.5FT	22	
	UAS-T1-S7-0-0.5FT	21	
	UAS-T2-S1-0-0.5FT	30	
	UAS-T2-S2-0-0.5FT	28	
	UAS-T2-S3-0-0.5FT	40	J
	UAS-T2-S4-0-0.5FT	46	
	UAS-T2-S5-0-0.5FT	30	J
	UAS-T2-S6-0-0.5FT	28	J
	UAS-T3-S1-0-0.5FT	30	
	UAS-T3-S2-0-0.5FT	39	J
	UAS-T3-S3-0-0.5FT	26	J
	UAS-T3-S4-0-0.5FT	42	J
	UAS-T3-S5-0-0.5FT	27	J
	UAS-T3-S6-0-0.5FT	23	J
	UAS-T3-S7-0-0.5FT	13	
	UAS-T4-S1-0-0.5FT	23	
	UAS-T4-S2-0-0.5FT	22	
	UAS-T4-S3-0-0.5FT	27	
	UAS-T4-S4-0-0.5FT	15	
	UAS-T4-S5-0-0.5FT	26	
	UAS-T4-S6-0-0.5FT	29	
	UAS-T4-S7-0-0.5FT	26	
	UAS-T5-S1-0-0.5FT	29	
	UAS-T5-S2-0-0.5FT	29	
	UAS-T5-S3-0-0.5FT	25	
	UAS-T5-S4-0-0.5FT	26	
	UAS-T5-S5-0-0.5FT	28	
	UAS-T5-S6-0-0.5FT	27	
	UAS-T6-S1-0-0.5FT	25	
	UAS-T6-S2-0-0.5FT	24	
	UAS-T6-S3-0-0.5FT	30	
	UAS-T6-S4-0-0.5FT	33	
	UAS-T6-S5-0-0.5FT	30	
	UAS-T7-S1-0-0.5FT	27	
	UAS-T7-S2-0-0.5FT	25	
	UAS-T7-S3-0-0.5FT	33	
	UAS-T7-S4-0-0.5FT	22	
	UAS-T7-S5-0-0.5FT	26	
	UAS-T7-S6-0-0.5FT	22	
	UAS-T7-S7-0-0.5FT	21	

Table 7-26
Floodplain Surface Soil Locations that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Zinc, mg/kg	Benchmark[1]	8.5	
	Background[2]	810	
	DAS-T1-S1-0-0.5FT	300	J
	DAS-T1-S2-0-0.5FT	230	J
	DAS-T1-S3-0-0.5FT	250	J
	DAS-T2-S1-0-0.5FT	290	J
	DAS-T2-S2-0-0.5FT	140	J
	DAS-T2-S3-0-0.5FT	260	J
	DAS-T3-S1-0-0.5FT	220	J
	DAS-T3-S2-0-0.5FT	240	J
	DAS-T3-S3-0-0.5FT	260	J
	DAS-T4-S1-0-0.5FT	240	J
	DAS-T4-S2-0-0.5FT	310	
	DAS-T4-S3-0-0.5FT	180	
	DAS-T5-S1-0-0.5FT	330	J
	DAS-T5-S2-0-0.5FT	140	J
	DAS-T5-S3-0-0.5FT	750	J
	DAS-T6-S1-0-0.5FT	350	
	DAS-T6-S2-0-0.5FT	110	
	DAS-T6-S3-0-0.5FT	240	
	DAS-T7-S1-0-0.5FT	**870**	
	DAS-T7-S2-0-0.5FT	260	
	UAS-T1-S1-0-0.5FT	**1400**	J
	UAS-T1-S2-0-0.5FT	340	J
	UAS-T1-S3-0-0.5FT	390	J
	UAS-T1-S4-0-0.5FT	280	J
	UAS-T1-S5-0-0.5FT	270	J
	UAS-T1-S6-0-0.5FT	180	J
	UAS-T1-S7-0-0.5FT	250	J
	UAS-T2-S1-0-0.5FT	310	J
	UAS-T2-S2-0-0.5FT	190	J
	UAS-T2-S3-0-0.5FT	250	J
	UAS-T2-S4-0-0.5FT	270	J
	UAS-T2-S5-0-0.5FT	210	J
	UAS-T2-S6-0-0.5FT	290	J
	UAS-T3-S1-0-0.5FT	160	
	UAS-T3-S2-0-0.5FT	240	
	UAS-T3-S3-0-0.5FT	160	J
	UAS-T3-S4-0-0.5FT	300	
	UAS-T3-S5-0-0.5FT	410	
	UAS-T3-S6-0-0.5FT	250	
	UAS-T3-S7-0-0.5FT	460	
	UAS-T4-S1-0-0.5FT	240	
	UAS-T4-S2-0-0.5FT	290	
	UAS-T4-S3-0-0.5FT	76	
	UAS-T4-S4-0-0.5FT	82	
	UAS-T4-S5-0-0.5FT	120	
	UAS-T4-S6-0-0.5FT	140	
	UAS-T4-S7-0-0.5FT	550	
	UAS-T5-S1-0-0.5FT	230	
	UAS-T5-S2-0-0.5FT	230	
	UAS-T5-S3-0-0.5FT	240	
	UAS-T5-S4-0-0.5FT	230	
	UAS-T5-S5-0-0.5FT	240	
	UAS-T5-S6-0-0.5FT	**980**	
	UAS-T6-S1-0-0.5FT	160	J
	UAS-T6-S2-0-0.5FT	82	J
	UAS-T6-S3-0-0.5FT	90	J
	UAS-T6-S4-0-0.5FT	99	J
	UAS-T6-S5-0-0.5FT	120	J
	UAS-T7-S1-0-0.5FT	610	
	UAS-T7-S2-0-0.5FT	190	
	UAS-T7-S3-0-0.5FT	270	
	UAS-T7-S4-0-0.5FT	150	
	UAS-T7-S5-0-0.5FT	160	
	UAS-T7-S6-0-0.5FT	310	
	UAS-T7-S7-0-0.5FT	640	

Table 7-26
Floodplain Surface Soil Locations that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Total PCBs, ug/kg	Benchmark[1]	371	
	Background[2]	1200	
	UAS-T6-S2-0-0.5FT	385	
2,3,7,8-TCDD TEQ (mammals) in ug/kg	Benchmark[1]	0.00315	
	Background[2]	0.124	
	DAS-T1-S1-0-0.5FT	0.0235855	
	DAS-T1-S2-0-0.5FT	0.016399	
	DAS-T1-S3-0-0.5FT	0.014051	
	DAS-T2-S1-0-0.5FT	0.02144	
	DAS-T2-S2-0-0.5FT	0.012195	
	DAS-T2-S3-0-0.5FT	0.017101	
	DAS-T3-S1-0-0.5FT	0.007658	
	DAS-T3-S2-0-0.5FT	0.008586	
	DAS-T3-S3-0-0.5FT	0.00766	
	DAS-T4-S1-0-0.5FT	0.016645	
	DAS-T4-S2-0-0.5FT	0.006258	
	DAS-T4-S3-0-0.5FT	0.006696	
	DAS-T5-S1-0-0.5FT	0.005006	
	DAS-T5-S2-0-0.5FT	0.005483	
	DAS-T5-S3-0-0.5FT	0.02432	
	DAS-T6-S1-0-0.5FT	0.009106	
	DAS-T6-S2-0-0.5FT	0.004063	
	DAS-T6-S3-0-0.5FT	0.006762	
	DAS-T7-S1-0-0.5FT	0.0034335	
	DAS-T7-S2-0-0.5FT	0.008225	
	UAS-T1-S1-0-0.5FT	0.01856	
	UAS-T1-S6-0-0.5FT	0.015206	
	UAS-T2-S4-0-0.5FT	0.01974	
	UAS-T3-S3-0-0.5FT	0.005056	
	UAS-T4-S1-0-0.5FT	0.008645	
	UAS-T4-S6-0-0.5FT	**0.187423**	
	UAS-T5-S4-0-0.5FT	0.00562	
	UAS-T6-S3-0-0.5FT	0.01658	
	UAS-T7-S3-0-0.5FT	0.0087385	

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints.

[2]Background concentration is twice average concentration for three background soil samples.

Shading indicates concentrations exceeds benchmark and background.

Table 7-27a
Comparison of Site G Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Dioxins, ug/kg								
2,3,7,8-TCDD TEQ (mammals)[2]	100%	4	0.01	1.323	no	0.124	0.00315	Maximum exceeds benchmark
Herbicides, ug/kg								
Metals, mg/kg								
Aluminum	100%	4	15000.00	15906	no	25400		No benchmark; within background
Antimony	50%	2	0.72	0.91	no	3.80	5	Maximum less than benchmark
Arsenic	100%	4	8.05	8.14	no	19.13	9.9	Maximum less than benchmark
Barium	100%	4	140.00	149	no	363	283	Maximum less than benchmark
Beryllium	100%	4	0.64	0.66	no	1.51	10	Maximum less than benchmark
Cadmium	100%	4	0.39	0.50	no	8.65	4	Maximum less than benchmark
Calcium	100%	4	14000.00	14008	no	33533		No benchmark; within background
Chromium	100%	4	22.00	22.76	no	39		No benchmark; within background
Cobalt	100%	4	8.60	8.69	no	16	20	Maximum less than benchmark
Copper	100%	4	290.00	600.28	no	209	60	Maximum exceeds benchmark
Iron	100%	4	20000.00	20489	no	38000		No benchmark; within background
Lead	100%	4	16.00	18.28	no	185	40.5	Maximum less than benchmark
Magnesium	100%	4	4950.00	5517	no	17233		Low toxicity
Manganese	100%	4	740.00	786	no	883		No benchmark; within background
Mercury	100%	4	0.03	0.03	no	0.18		No benchmark; within background
Molybdenum	100%	4	0.78	0.97	no	2.02	2	Maximum less than benchmark
Nickel	100%	4	21.50	21.71	no	42.67	30	Maximum less than benchmark
Potassium	100%	4	1700.00	1870	no	4733		Low toxicity
Vanadium	100%	4	40.00	40.87	no	69	2	Maximum exceeds benchmark
Zinc	100%	4	69.50	NC	no	808	8.5	Maximum exceeds benchmark
PCBs, ug/kg								
Total PCBs	50%	4	46.50	778.56	no	1200	371	Maximum less than benchmark
Pesticides, ug/kg								
4,4'-DDT	75%	3	0.16	0.33	no	14.12		No benchmark; within background
Alpha Chlordane	*50%*	*2*	*0.26*	*0.63*	*no*	*ND*		*No benchmark; ND in background*
delta-BHC	75%	3	0.18	3.40	no	ND		No benchmark; ND in background
Dieldrin	25%	1	0.06	NC	no	ND		No benchmark; ND in background
Endosulfan I	25%	1	0.22	NC	no	ND		No benchmark; ND in background
Endosulfan II	25%	1	0.34	NC	no	ND		No benchmark; ND in background
Endosulfan sulfate	50%	2	0.18	0.34	no	ND		No benchmark; ND in background
Endrin	50%	2	0.16	0.19	no	ND		No benchmark; ND in background
Endrin aldehyde	50%	2	0.67	NC	no	ND		No benchmark; ND in background
Endrin ketone	50%	2	1.03	1.67	no	ND		No benchmark; ND in background
Gamma Chlordane	75%	3	0.31	0.40	no	ND		No benchmark; ND in background
Heptachlor epoxide	25%	1	0.22	NC		ND		No benchmark; ND in background
Methoxychlor	25%	1	0.94	NC		ND		No benchmark; ND in background
SVOCs, ug/kg								
VOCs, ug/kg								

ND = Not detected

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

[2]Calculated according to 1998 World Health Organization guidelines for mammals; Estimated Maximum Potential Concentration treated as non-detects.

only compounds detected at least once are listed in this table

Yellow shading indicates maximum site concentration exceeds benchmark.

Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil).

Table 7-27b
Comparison of Site H Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Dioxins, ug/kg								
2,3,7,8-TCDD TEQ (mammals)[2]	100%	4	1.291	177220.313	no	0.124	0.00315	Maximum exceeds benchmark
Herbicides, ug/kg								
2,4-DB	50%	4	9.70	9.94	no	ND		No benchmark; ND in background
Metals, mg/kg								
Aluminum	100%	4	14000	39230	no	25400		No benchmark; within background
Antimony	100%	4	2.30	2.37	no	3.80	5	Maximum less than benchmark
Arsenic	100%	4	64.00	7216.39	no	19.13	9.9	Maximum exceeds benchmark
Barium	100%	4	120	124	no	363	283	Maximum less than benchmark
Beryllium	100%	4	3.80	46.91	no	1.51	10	Maximum less than benchmark
Cadmium	100%	4	22.00	2166.24	no	8.65	4	Maximum exceeds benchmark
Calcium	100%	4	42000	1071222	no	33533		Low toxicity
Chromium	100%	4	23.00	23.40	no	39		No benchmark; within background
Cobalt	100%	4	20.00	86.11	no	16	20	Maximum equal to benchmark
Copper	100%	4	480	532.72	no	209	60	Maximum exceeds benchmark
Iron	100%	4	18000	18260	no	38000		No benchmark; within background
Lead	100%	4	230	243.58	no	185	40.5	Maximum exceeds benchmark
Magnesium	100%	4	2500	3069	no	17233		No benchmark; within background
Manganese	100%	4	720	739	no	883		No benchmark; within background
Mercury	100%	4	0.77	142.37	no	0.18		No benchmark; exceeds background
Molybdenum	100%	4	11.00	981.99	no	2.02	2	Maximum exceeds benchmark
Nickel	100%	4	70	215.29	no	42.67	30	Maximum exceeds benchmark
Potassium	100%	4	1600	1890	no	4733		Low toxicity
Selenium	75%	4	4.70	941.90	no	ND	0.21	Maximum exceeds benchmark
Sodium	100%	4	390.00	395.84	no	ND		Low toxicity
Silver	75%	4	2.70	2.64	yes	1.35	2	Maximum exceeds benchmark
Thallium	25%	4	2.50	29.97	no	ND	1	Maximum exceeds benchmark
Vanadium	100%	4	45	69.01	no	69	2	Maximum exceeds benchmark
Zinc	100%	4	3600	628746	no	808	8.5	Maximum exceeds benchmark
PCBs, ug/kg								
Total PCBs	75%	4	1519	1563.37	no	1200	371	Maximum exceeds benchmark
Pesticides, ug/kg								
4,4'-DDE	75%	4	86	800339929.23	no	16.12		No benchmark; exceeds background
4,4'-DDT	75%	4	110	11675720159.04	no	14.12		No benchmark; exceeds background
Aldrin	50%	4	21	19.44	yes	ND		No benchmark; ND in background
Endosulfan II	25%	3	7.20	1853.29	no	ND		No benchmark; ND in background
Endrin ketone	75%	4	82.0000	10230171916.44	no	ND		No benchmark; ND in background
Gamma Chlordane	50%	4	30.00	33.50	no	ND		No benchmark; ND in background
Heptachlor	25%	3	2	8.26	no	*ND*		*No benchmark; ND in background*
Heptachlor epoxide	75%	4	44	1108116322805.02	no	ND		No benchmark; ND in background
Methoxychlor	50%	4	130	199687.00	no	ND		No benchmark; ND in background
SVOCs, ug/kg								
Benzo(a)anthracene	75%	4	130	133	no	240		No benchmark; within background
Benzo(a)pyrene	75%	4	140	145	no	187		No benchmark; within background
Benzo(b)fluoranthene	75%	4	140	154	no	179		No benchmark; within background
Benzo(g,h,i)perylene	25%	4	370	2168	no	127		No benchmark; higher than background
Benzo(k)fluoranthene	75%	4	130	137	no	208		No benchmark; within background
bis(2-Ethylhexyl)phthalate	50%	4	120	126	no	322		No benchmark; within background
Chrysene	75%	4	300	734	no	273		No benchmark; higher than background
Fluoranthene	75%	4	240	250	no	502		No benchmark; within background
Indeno(1,2,3-cd)pyrene	50%	4	100	NC	no	ND		No benchmark; ND in background
Pentachlorophenol	25%	4	241	241	no	742	3000	Maximum less than benchmark
Phenanthrene	25%	4	110	NC	no	335		No benchmark; within background
Pyrene	75%	4	190	213	no	435		No benchmark; within background
VOCs, ug/kg								

Table 7-27b
Comparison of Site H Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
2-Hexanone	25%	1	5.70	NC	no	33.00		No benchmark; within background
Carbon disulfide	25%	3	4.30	4.89	no	ND		No benchmark; ND in background
Tetrachloroethene	25%	4	17.00	297.55	no			No benchmark; ND in background

ND = Not detected

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

[2]Calculated according to 1998 World Health Organization guidelines for mammals; Estimated Maximum Potential Concentration treated as non-detects.

only compounds detected at least once are listed in this table

Yellow shading indicates maximum site concentration exceeds benchmark.

Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil).

Table 7-27c
Comparison of Site I Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Dioxins, ug/kg								
2,3,7,8-TCDD TEQ (mammals)[2]	100%	4	12.682	5.82975E+13	no	0.124	0.00315	Maximum exceeds benchmark
Herbicides, ug/kg								
2,4-DB	25%	3	29.13	837327.9674	no	ND		No benchmark; ND in background
Metals, mg/kg								
Aluminum	100%	4	8000	10373.04485	no	25400		No benchmark; within background
Antimony	100%	4	8.40	27.06307144	no	3.80	5	Maximum exceeds benchmark
Arsenic	100%	4	12.00	12.09603333	no	19.13	9.9	Maximum exceeds benchmark
Barium	100%	4	740	40737.84503	no	363	283	Maximum exceeds benchmark
Beryllium	100%	4	1.70	4.645394701	no	1.51	10	Maximum less than benchmark
Cadmium	100%	4	31.00	45692.89244	no	8.65	4	Maximum exceeds benchmark
Calcium	100%	4	235000	480323.5391	no	33533		Low toxicity
Chromium	100%	4	65.00	557.0784649	no	39		No benchmark; exceeds background
Cobalt	100%	4	33.00	18037.66354	no	16	20	Maximum exceeds benchmark
Copper	100%	4	13000	13393.5185	no	209	60	Maximum exceeds benchmark
Iron	100%	4	16000	16047.63857	no	38000		No benchmark; within background
Lead	100%	4	1500	1410.13458	yes	185	40.5	Maximum exceeds benchmark
Magnesium	100%	4	19000	28676.00543	no	17233		Low toxicity
Manganese	100%	4	300	355.9479591	no	883		No benchmark; within background
Mercury	100%	4	2.00	5713355.711	no	0.18		No benchmark; exceeds background
Molybdenum	100%	4	8.50	8.966566712	no	2.02	2	Maximum exceeds benchmark
Nickel	100%	4	65	446.1117448	no	42.67	30	Maximum exceeds benchmark
Potassium	100%	4	1500	1588.502918	no	4733		Low toxicity
Selenium	75%	4	1.60	6.886829613	no	ND	0.21	Maximum exceeds benchmark
Silver	100%	4	19.00	5711.850233	no	1.35	2	Maximum exceeds benchmark
Sodium	100%	4	870.00	885.626716	no			Low toxicity
Vanadium	100%	4	26	26.2846367	no	69	2	Maximum exceeds benchmark
Zinc	100%	4	2800	43298.37599	no	808	8.5	Maximum exceeds benchmark
PCBs, ug/kg								
Total PCBs	75%	4	121280	8.7794E+28	no	1200	371	Maximum exceeds benchmark
Pesticides, ug/kg								
4,4'-DDD	100%	3	200	6.18723E+56	no	ND		No benchmark; ND in background
4,4'-DDE	100%	3	300	1.35573E+32	no	16.12		No benchmark; exceeds background
4,4'-DDT	67%	3	460	3.97531E+32	no	14.12		No benchmark; exceeds background
Aldrin	100%	3	250	2.36762E+38	no	ND		No benchmark; ND in background
Alpha Chlordane	33%	1	3	NC	no	ND		No benchmark; ND in background
Dieldrin	100%	3	200	6.66751E+25	no	ND		No benchmark; ND in background
Endosulfan I	100%	3	260.00	6.20887E+38	no			No benchmark; ND in background
Endosulfan II	100%	3	600.00	3.86916E+35	no	ND		No benchmark; ND in background
Endosulfan sulfate	33%	2	8.80	9.59706229	no	ND		No benchmark; ND in background
Endrin	100%	3	240.00	1.43789E+35	no	ND		No benchmark; ND in background
Endrin aldehyde	100%	3	1500.00	5.89694E+37	no	ND		No benchmark; ND in background
Endrin ketone	100%	3	700.0000	1.29277E+33	no	ND		No benchmark; ND in background
Gamma Chlordane	100%	3	380.00	1.17964E+24	no	ND		No benchmark; ND in background
Heptachlor	67%	3	69	3.90883E+21	no	ND		No benchmark; ND in background
Heptachlor epoxide	100%	3	140	3.51219E+28	no	ND		No benchmark; ND in background
Methoxychlor	100%	3	3000	1.36839E+33	no	ND		No benchmark; ND in background
SVOCs, ug/kg								
1,4-Dichlorobenzene	25%	1	46.00	NC	no	ND	20000	Maximum less than benchmark
1,2,4-Trichlorobenzene	25%	4	180.00	238.3835621	no	ND	20000	Maximum less than benchmark
2,4-Dichlorophenol	25%	1	82.00	NC	no	ND		No benchmark; ND in background
2-Nitroaniline	25%	1	160.00	NC	no	ND		No benchmark; ND in background
4-Chloroaniline	50%	4	18000.00	3.34508E+15	no	ND		No benchmark; ND in background
Anthracene	50%	4	730	3367658.288	no	160		No benchmark; higher than background
Benzo(a)anthracene	75%	4	2200	136193831.4	no	240		No benchmark; higher than background
Benzo(a)pyrene	75%	4	2200	2965105917	no	187		No benchmark; higher than background
Benzo(b)fluoranthene	75%	4	2800	406310864.3	no	179		No benchmark; higher than background
Benzo(g,h,i)perylene	75%	4	1600	5618456.655	no	127		No benchmark; higher than background
Benzo(k)fluoranthene	75%	4	960	1054145.623	no	208		No benchmark; higher than background
bis(2-Ethylhexyl)phthalate	25%	1	88	NC	no	322		No benchmark; within background
Carbazole	25%	4	320	1299.336446	no	64		No benchmark; higher than background

Table 7-27c

Comparison of Site I Surface Soil Concentrations to Ecological Benchmarks

Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Chrysene	75%	4	2200	55268524.04	no	273		No benchmark; higher than background
Dibenzo(a,h)anthracene	50%	4	360	44378.40136	no	ND		No benchmark; ND in background
Dibenzofuran	*25%*	*4*	*100*	*100.0954465*	*no*	*ND*		*No benchmark; ND in background*
Di-n-butylphthalate	25%	1	52	NC	no	312	200000	Maximum less than benchmark
Fluoranthene	100%	4	6000	23187272884	no	502		No benchmark; higher than background
Fluorene	25%	4	230	433.0037693	no	ND		No benchmark; ND in background
Hexachlorobenzene	25%	4	110.00	291.9069705	no	ND		No benchmark; ND in background
Indeno(1,2,3-cd)pyrene	50%	4	1600	7840824.52	no	ND		No benchmark; ND in background
Naphthalene						ND		
Pentachlorophenol	100%	4	1650	63284.90405	no	742	3000	Maximum less than benchmark
Phenanthrene	100%	4	3300	3.2062E+11	no	335		No benchmark; higher than background
Pyrene	100%	4	4700	1138027755	no	435		No benchmark; higher than background
VOCs, ug/kg								
Toluene	25%	4	3.3	3.389891562	no	ND	200000	Maximum less than benchmark

ND = Not detected

[1] Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

[2] Calculated according to 1998 World Health Organization guidelines for mammals; Estimated Maximum Potential Concentration treated as non-detects.

Yellow shading indicates maximum site concentration exceeds benchmark.

Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil).

Table 7-27d
Comparison of Site L Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Dioxins, ug/kg								
2,3,7,8-TCDD TEQ (mammals)[2]	100%	4	0.821	124.7416336	no	0.124	0.00315	Maximum exceeds benchmark
Herbicides, ug/kg								
Metals, mg/kg								
Aluminum	100%	4	7600	7979.493203	no	25400		No benchmark; within background
Antimony	100%	4	5.40	8.850128	no	3.80	5	Maximum exceeds benchmark
Arsenic	100%	4	37.00	NC	no	19.13	9.9	Maximum exceeds benchmark
Barium	100%	4	250	268.6028182	no	363	283	Maximum less than benchmark
Beryllium	100%	4	1.60	NC	no	1.51	10	Maximum less than benchmark
Cadmium	100%	4	10.00	10.23619922	no	8.65	4	Maximum exceeds benchmark
Calcium	100%	4	29000	34213.75505	no	33533		Low toxicity
Chromium	100%	4	79.00	448.9603833	no	39		No benchmark; exceeds background
Cobalt	100%	4	17.00	18.97604255	no	16	20	Maximum less than benchmark
Copper	100%	4	4700	74139227.8	no	209	60	Maximum exceeds benchmark
Cyanide, Total	25%	4	2	36.64438482	no			No benchmark; ND in background
Iron	100%	4	32000	36106.95214	no	38000		No benchmark; within background
Lead	100%	4	940	253773.3978	no	185	40.5	Maximum exceeds benchmark
Magnesium	100%	4	4200	4448.648413	no	17233		Low toxicity
Manganese	100%	4	650	675.584256	no	883		No benchmark; within background
Mercury	*100%*	*4*	*0.56*	*0.57447441*	*no*	*0.18*		*No benchmark; exceeds background*
Molybdenum	100%	4	23.00	42.61943575	no	2.02	2	Maximum exceeds benchmark
Nickel	100%	4	55	55.78187695	no	42.67	30	Maximum exceeds benchmark
Potassium	100%	4	1700	1676.575721	yes	4733		Low toxicity
Selenium	100%	4	4.30	8.99621133	no	ND	0.21	Maximum exceeds benchmark
Silver	75%	4	1.20	1.572152807	no	1.35	2	Maximum less than benchmark
Sodium	100%	4	540.00	1093.938624	no			Low toxicity
Thallium	100%	4	2.10	2.094945789	yes	ND	1	Maximum exceeds benchmark
Vanadium	100%	4	49	53.02223759	no	69	2	Maximum exceeds benchmark
Zinc	100%	4	870	860.7747902	yes	808	8.5	Maximum exceeds benchmark
PCBs, ug/kg								
Total PCBs	50%	4	1171	1065.507332	yes	1200	371	Maximum exceeds benchmark
Pesticides, ug/kg								
4,4'-DDE	75%	4	20	19.74577626	yes	16.12		No benchmark; exceeds background
4,4'-DDT	25%	4	16	15.77170892	yes	14.12		No benchmark; exceeds background
Aldrin	25%	4	6	6.194243663	no	ND		No benchmark; ND in background
beta-BHC	25%	4	3.70	1356.706081	no	ND		No benchmark; ND in background
Dieldrin	25%	4	12	12.88917529	no	ND		No benchmark; ND in background
Endrin ketone	75%	4	28.0000	12283.87693	no	ND		No benchmark; ND in background
Gamma Chlordane	75%	4	21.00	21.34574954	no	ND		No benchmark; ND in background
Heptachlor epoxide	75%	4	9	10.51387628	no	ND		No benchmark; ND in background
Methoxychlor	50%	3	46	57.70715929	no	ND		No benchmark; ND in background
SVOCs, ug/kg								
2-Methylnaphthalene	*25%*	*4*	*140*	*147.440499*	*no*	*ND*		*No benchmark; ND in background*
Acenaphthene	50%	4	1600	8491211.257	no	ND	20000	Maximum less than benchmark
Anthracene	75%	4	3600	994773566.6	no	160		No benchmark; exceeds background
Benzo(a)anthracene	75%	4	7800	3.26082E+11	no	240		No benchmark; exceeds background
Benzo(a)pyrene	75%	4	7000	3.48435E+13	no	187		No benchmark; exceeds background
Benzo(b)fluoranthene	75%	4	6600	70233148182	no	179		No benchmark; exceeds background
Benzo(g,h,i)perylene	75%	4	3800	1144351859	no	127		No benchmark; exceeds background
Benzo(k)fluoranthene	75%	4	6800	2.1238E+11	no	208		No benchmark; exceeds background
bis(2-Ethylhexyl)phthalate	50%	4	310	797.5198398	no	322		No benchmark; within background
Carbazole	75%	4	1500	1616221.149	no	64		No benchmark; exceeds background
Chrysene	75%	4	7800	3.66513E+11	no	273		No benchmark; exceeds background
Dibenzo(a,h)anthracene	50%	4	1300	584071173.7	no	ND		No benchmark; ND in background
Dibenzofuran	25%	4	750	82381.06931	no	ND		No benchmark; ND in background
Fluoranthene	75%	4	18000	1.57152E+15	no	502		No benchmark; exceeds background
Fluorene	50%	4	1400	5221331.358	no	ND		No benchmark; ND in background
Indeno(1,2,3-cd)pyrene	75%	4	4800	7509937085	no	ND		No benchmark; ND in background
Naphthalene	25%	4	320	1222.742364	no	ND		No benchmark; ND in background
Pentachlorophenol	25%	3	240	243.3192197	no	742	3000	Maximum less than benchmark
Phenanthrene	75%	4	12000	7.19159E+12	no	335		No benchmark; exceeds background

Table 7-27d
Comparison of Site L Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Pyrene	75%	4	13000	4.88372E+13	no	435		No benchmark; exceeds background
VOCs, ug/kg								
Toluene	25%	4	13.0	62.31309822	no	ND	200000	Maximum less than benchmark

ND = Not detected

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

[2]Calculated according to 1998 World Health Organization guidelines for mammals; Estimated Maximum Potential Concentration treated as non-detects.

Yellow shading indicates maximum site concentration exceeds benchmark.
Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil).

Table 7-27e
Comparison of Site N Surface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent	Frequency of Detection in Soil	Number of Samples for Statistics	Maximum site concentration	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration	Soil Benchmark[1]	Comment
Dioxins, ug/kg								
2,3,7,8-TCDD TEQ (mammals)[2]	100%	4	0.345	29108960.28	no	0.124	0.00315	Maximum exceeds benchmark
Herbicides, ug/kg								
Metals, mg/kg								
Aluminum	100%	4	11000	11367.87884	no	25400		No benchmark; within background
Antimony	25%	1	0.71	NC	no	3.80	5	Maximum less than benchmark
Arsenic	100%	4	7.30	7.465249928	no	19.13	9.9	Maximum less than benchmark
Barium	100%	4	1200	1209.136124	no	363	283	Maximum exceeds benchmark
Cadmium	100%	4	1.50	11.80319879	no	8.65	4	Maximum less than benchmark
Calcium	100%	4	109000	1985134.1	no	33533		Low toxicity
Chromium	100%	4	18.00	22.93479523	no	39		No benchmark; within background
Cobalt	100%	4	6.15	NC	no	16	20	Maximum less than benchmark
Copper	100%	4	110	2284.996321	no	209	60	Maximum exceeds benchmark
Iron	100%	4	15000	15376.58677	no	38000		No benchmark; within background
Lead	100%	4	410	5632358.094	no	185	40.5	Maximum exceeds benchmark
Magnesium	100%	4	11500	15898.24309	no	17233		Low toxicity
Manganese	100%	4	410	447.4493181	no	883		No benchmark; within background
Mercury	100%	4	0.10	0.351694441	no	0.18		No benchmark; within background
Molybdenum	100%	4	1.45	1.816470731	no	2.02	2	Maximum less than benchmark
Nickel	100%	4	17	17.12978312	no	42.67	30	Maximum less than benchmark
Potassium	100%	4	1600	1614.831668	no	4733		Low toxicity
Selenium	25%	4	0.68	0.691327842	no	ND	0.21	Maximum exceeds benchmark
Vanadium	100%	4	29	29.3885723	no	69	2	Maximum exceeds benchmark
Zinc	100%	4	250	260.8110532	no	808	8.5	Maximum exceeds benchmark
PCBs, ug/kg								
Total PCBs	25%	4	178	5078256.548	no	1200	371	Maximum less than benchmark
Pesticides, ug/kg								
4,4'-DDT	25%	4	3	2.820036127	no	14.12		No benchmark; within background
Aldrin	25%	3	1	1.389998414	no	ND		No benchmark; ND in background
Alpha Chlordane	25%	3	1	1.161332487	no	ND		No benchmark; ND in background
beta-BHC	25%	3	0.34	0.382196942	no	ND		No benchmark; ND in background
Dieldrin	25%	3	2	2.328499227	no	ND		No benchmark; ND in background
Gamma Chlordane	25%	4	1.85	3.731761647	no	ND		No benchmark; ND in background
Methoxychlor	25%	4	55	1402.087203	no	ND		No benchmark; ND in background
SVOCs, ug/kg								
Anthracene	75%	3	58	65.54441005	no	160		No benchmark; within background
Benzo(a)anthracene	100%	4	270	277.2454654	no	240		No benchmark; exceeds background
Benzo(a)pyrene	100%	4	330	2741.750887	no	187		No benchmark; exceeds background
Benzo(b)fluoranthene	100%	4	320	3553.567584	no	179		No benchmark; exceeds background
Benzo(g,h,i)perylene	25%	4	300	965.7584844	no	127		No benchmark; exceeds background
Benzo(k)fluoranthene	100%	4	360	370.1287912	no	208		No benchmark; exceeds background
bis(2-Ethylhexyl)phthalate	25%	4	130	133.305617	no	322		No benchmark; within background
Chrysene	100%	4	310	1427.615009	no	273		No benchmark; exceeds background
Dibenzo(a,h)anthracene	50%	4	110	106.7183083	yes	ND		No benchmark; ND in background
Fluoranthene	100%	4	610	626.730565	no	502		No benchmark; exceeds background
Indeno(1,2,3-cd)pyrene	75%	4	250	569.6321335	no	ND		No benchmark; ND in background
Pentachlorophenol	100%	4	474	613.1716845	no	742	3000	Maximum less than benchmark
Phenanthrene	100%	4	260	263.4323597	no	335		No benchmark; less than background
Pyrene	100%	4	550	551.3228038	no	435		No benchmark; exceeds background
VOCs, ug/kg								

ND = Not detected

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

[2]Calculated according to 1998 World Health Organization guidelines for mammals; Estimated Maximum Potential Concentration treated as non-detects.

Yellow shading indicates maximum site concentration exceeds benchmark.
Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil).

Table 7-28
Surface Soil Locations from Sites G, H, I, L, and N that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Antimony	Benchmark[1]	5	
mg/kg	Background[2]	3.8	
	WASTE-I-B2-0-0.5FT	**8.4**	J
	WASTE-I-B3-0-0.5FT	**8.4**	J
	WASTE-I-B4-0-0.5FTFD	**5.3**	J
	WASTE-L-B1-0-0.5FT	**5.4**	J
Arsenic	Benchmark[1]	9.9	
mg/kg	Background[2]	19	
	WASTE-H-B3-0-0.5FT	**64**	
	WASTE-H-B4-0-0.5FT	13	
	WASTE-I-B3-0-0.5FT	12	J
	WASTE-L-B1-0-0.5FT	**35**	
	WASTE-L-B2-0-0.5FT	**37**	
	WASTE-L-B3-0-0.5FT	**30**	
	WASTE-L-B4-0-0.5FT	**31**	
Barium	Benchmark[1]	283	
mg/kg	Background[2]	363	
	WASTE-I-B2-0-0.5FT	**740**	
	WASTE-N-B1-0-0.5FT	**860**	J
	WASTE-N-B2-0-0.5FT	**1200**	J
Cadmium	Benchmark[1]	4	
mg/kg	Background[2]	8.6	
	WASTE-H-B1-0-0.5FT	**8.7**	J
	WASTE-H-B4-0-0.5FT	**22**	J
	WASTE-I-B2-0-0.5FT	**31**	J
	WASTE-I-B3-0-0.5FT	**9.2**	J
	WASTE-L-B1-0-0.5FT	**10**	J
	WASTE-L-B2-0-0.5FT	4.6	J
	WASTE-L-B4-0-0.5FT	7.1	J
Cobalt	Benchmark[1]	20	
mg/kg	Background[2]	16	
	WASTE-I-B2-0-0.5FT	**33**	
Copper	Benchmark[1]	60	
mg/kg	Background[2]	209	
	WASTE-G-B1-0-0.5FT	190	J
	WASTE-G-B1-0-0.5FTFD	**390**	J
	WASTE-G-B2-0-0.5FT	200	J
	WASTE-G-B3-0-0.5FT	140	J
	WASTE-G-B4-0-0.5FT	100	J
	WASTE-H-B1-0-0.5FT	**480**	
	WASTE-H-B2-0-0.5FT	200	
	WASTE-H-B3-0-0.5FT	**340**	
	WASTE-H-B4-0-0.5FT	**480**	
	WASTE-I-B1-0-0.5FT	**2000**	J
	WASTE-I-B2-0-0.5FT	**10000**	J
	WASTE-I-B3-0-0.5FT	**13000**	J
	WASTE-I-B4-0-0.5FT	**1200**	J
	WASTE-I-B4-0-0.5FTFD	**2100**	J
	WASTE-L-B1-0-0.5FT	**1700**	
	WASTE-L-B2-0-0.5FT	**4700**	
	WASTE-L-B3-0-0.5FT	190	
	WASTE-L-B4-0-0.5FT	**460**	
	WASTE-N-B2-0-0.5FT	110	J

Table 7-28
Surface Soil Locations from Sites G, H, I, L, and N that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Lead	Benchmark[1]	41	
mg/kg	Background[2]	185	
	WASTE-H-B1-0-0.5FT	**200**	J
	WASTE-H-B2-0-0.5FT	53	J
	WASTE-H-B3-0-0.5FT	100	J
	WASTE-H-B4-0-0 5FT	**230**	J
	WASTE-I-B1-0-0.5FT	**220**	J
	WASTE-I-B2-0-0.5FT	**1500**	J
	WASTE-I-B3-0-0.5FT	**830**	J
	WASTE-I-B4-0-0 5FT	**190**	J
	WASTE-I-B4-0-0 5FTFD	**270**	J
	WASTE-L-B1-0-0.5FT	**940**	J
	WASTE-L-B2-0-0.5FT	**190**	J
	WASTE-L-B3-0-0.5FT	64	J
	WASTE-L-B4-0-0.5FT	**280**	J
	WASTE-N-B1-0-0.5FT	**410**	J
	WASTE-N-B2-0-0.5FT	99	J
Molybdenum	Benchmark[1]	2	
mg/kg	Background[2]	2.0	
	WASTE-H-B1-0-0 5FT	**3.6**	J
	WASTE-H-B3-0-0.5FT	**11**	J
	WASTE-H-B4-0-0 5FT	**4.2**	J
	WASTE-I-B1-0-0.5FT	**2.7**	J
	WASTE-I-B2-0-0 5FT	**7.5**	J
	WASTE-I-B3-0-0.5FT	**8.5**	J
	WASTE-I-B4-0-0.5FT	**3.4**	J
	WASTE-I-B4-0-0.5FTFD	**6.1**	J
	WASTE-L-B1-0-0 5FT	**16**	J
	WASTE-L-B2-0-0.5FT	**23**	J
	WASTE-L-B3-0-0 5FT	**9.3**	J
	WASTE-L-B4-0-0 5FT	**9.6**	J
Nickel	Benchmark[1]	30	
mg/kg	Background[2]	43	
	WASTE-H-B3-0-0 5FT	**70**	
	WASTE-I-B2-0-0.5FT	42	J
	WASTE-I-B3-0-0.5FT	**65**	J
	WASTE-L-B1-0-0 5FT	**51**	
	WASTE-L-B2-0-0.5FT	**43**	
	WASTE-L-B3-0-0 5FT	38	
	WASTE-L-B4-0-0.5FT	**55**	
Selenium	Benchmark[1]	0.21	
mg/kg	Background[2]	ND	
	WASTE-G-B1-0-0.5FT	**1.2**	U
	WASTE-G-B1-0-0.5FTFD	**1.2**	U
	WASTE-G-B2-0-0 5FT	**1.2**	U
	WASTE-G-B3-0-0.5FT	**1.1**	U
	WASTE-G-B4-0-0 5FT	**1.1**	U
	WASTE-H-B1-0-0.5FT	**0.64**	J
	WASTE-H-B2-0-0.5FT	**1.1**	U
	WASTE-H-B3-0-0.5FT	**4.7**	
	WASTE-H-B4-0-0 5FT	**0.42**	J
	WASTE-I-B1-0-0.5FT	**1.1**	U
	WASTE-I-B2-0-0.5FT	**1.6**	
	WASTE-I-B3-0-0.5FT	**1.6**	
	WASTE-I-B4-0-0 5FT	**0.44**	J
	WASTE-I-B4-0-0.5FTFD	**0.83**	J
	WASTE-L-B1-0-0.5FT	**4.3**	
	WASTE-L-B2-0-0.5FT	**4**	
	WASTE-L-B3-0-0.5FT	**1.8**	
	WASTE-L-B4-0-0.5FT	**2.2**	
	WASTE-N-B1-0-0.5FT	**1.1**	U
	WASTE-N-B2-0-0 5FT	**0.99**	U
	WASTE-N-B3-0-0 5FT	**1.1**	U
	WASTE-N-B4-0-0 5FT	**0.61**	J
	WASTE-N-B4-0-0 5FTFD	**0.75**	J

Table 7-28
Surface Soil Locations from Sites G, H, I, L, and N that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
Silver	Benchmark[1]	2	
mg/kg	Background[2]	1.4	
	WASTE-H-B4-0-0 5FT	**2.7**	J
	WASTE-I-B1-0-0.5FT	**3.1**	J
	WASTE-I-B2-0-0.5FT	**11**	J
	WASTE-I-B3-0-0.5FT	**19**	J
	WASTE-I-B4-0-0 5FTFD	**2.2**	J
Thallium	Benchmark[1]	1	
mg/kg	Background[2]	ND	
	WASTE-G-B1-0-0.5FT	**1.2**	U
	WASTE-G-B1-0-0.5FTFD	**1.2**	U
	WASTE-G-B2-0-0 5FT	**1.2**	U
	WASTE-G-B3-0-0.5FT	**1.1**	U
	WASTE-G-B4-0-0 5FT	**1.1**	U
	WASTE-H-B2-0-0 5FT	**1.1**	U
	WASTE-H-B3-0-0.5FT	**2.5**	
	WASTE-I-B1-0-0 5FT	**1.1**	U
	WASTE-L-B1-0-0.5FT	**2.1**	
	WASTE-L-B2-0-0.5FT	**1.9**	
	WASTE-L-B3-0-0.5FT	**1.6**	
	WASTE-L-B4-0-0.5FT	**1.8**	
	WASTE-N-B1-0-0.5FT	**1.1**	U
	WASTE-N-B4-0-0.5FT	**1.1**	U
Vanadium	Benchmark[1]	2	
mg/kg	Background[2]	69	
	WASTE-G-B1-0-0.5FT	39	J
	WASTE-G-B1-0-0.5FTFD	39	J
	WASTE-G-B2-0-0.5FT	40	J
	WASTE-G-B3-0-0.5FT	32	J
	WASTE-G-B4-0-0 5FT	32	J
	WASTE-H-B1-0-0 5FT	20	
	WASTE-H-B2-0-0.5FT	33	
	WASTE-H-B3-0-0.5FT	45	
	WASTE-H-B4-0-0.5FT	22	
	WASTE-I-B1-0-0 5FT	17	J
	WASTE-I-B2-0-0.5FT	21	J
	WASTE-I-B3-0-0 5FT	26	J
	WASTE-I-B4-0-0.5FT	9 4	J
	WASTE-I-B4-0-0.5FTFD	12	J
	WASTE-L-B1-0-0.5FT	49	
	WASTE-L-B2-0-0.5FT	40	
	WASTE-L-B3-0-0.5FT	39	
	WASTE-L-B4-0-0.5FT	49	
	WASTE-N-B1-0-0 5FT	21	
	WASTE-N-B2-0-0.5FT	23	
	WASTE-N-B3-0-0.5FT	22	
	WASTE-N-B4-0-0 5FT	27	
	WASTE-N-B4-0-0.5FTFD	31	
Zinc	Benchmark[1]	8.5	
mg/kg	Background[2]	808	
	WASTE-G-B1-0-0.5FT	64	J
	WASTE-G-B1-0-0 5FTFD	75	J
	WASTE-G-B2-0-0 5FT	56	J
	WASTE-G-B3-0-0.5FT	60	J
	WASTE-G-B4-0-0.5FT	58	J
	WASTE-H-B1-0-0.5FT	800	J
	WASTE-H-B2-0-0 5FT	350	J
	WASTE-H-B3-0-0 5FT	370	J
	WASTE-H-B4-0-0.5FT	**3600**	J
	WASTE-I-B1-0-0 5FT	**1200**	J
	WASTE-I-B2-0-0.5FT	**2800**	J
	WASTE-I-B3-0-0.5FT	**1300**	J
	WASTE-I-B4-0-0 5FT	310	J
	WASTE-I-B4-0-0.5FTFD	500	J
	WASTE-L-B1-0-0.5FT	**870**	J
	WASTE-L-B2-0-0.5FT	420	J
	WASTE-L-B3-0-0.5FT	160	J
	WASTE-L-B4-0-0 5FT	590	J
	WASTE-N-B1-0-0.5FT	210	J
	WASTE-N-B2-0-0 5FT	250	J
	WASTE-N-B3-0-0 5FT	62	J
	WASTE-N-B4-0-0.5FT	71	J
	WASTE-N-B4-0-0 5FTFD	79	J

Table 7-28
Surface Soil Locations from Sites G, H, I, L, and N that Exceed Ecological Benchmarks
Sauget Area I

Constituent	Sample ID	Concentration	ER Q
1998 Total TEQ w/ EMPC as ND[3]	Benchmark[1]	0 0032	
ug/kg	Background[2]	0 12	
	WASTE-G-B1-0-0.5FT	0.071312	
	WASTE-G-B1-0-0.5FTFD	0 063519	
	WASTE-G-B2-0-0.5FT	0.07705	
	WASTE-G-B3-0-0.5FT	0 075513	
	WASTE-G-B4-0-0.5FT	0.0821635	
	WASTE-H-B1-0-0 5FT	**0.51835**	
	WASTE-H-B2-0-0.5FT	**0.28994**	
	WASTE-H-B3-0-0 5FT	0 035028	
	WASTE-H-B4-0-0 5FT	**1.29117**	
	WASTE-I-B1-0-0.5FT	0.0952	
	WASTE-I-B2-0-0 5FT	**12.842**	
	WASTE-I-B3-0-0 5FT	**0.53721**	
	WASTE-I-B4-0-0 5FT	0.05881	
	WASTE-I-B4-0-0 5FTFD	0 11224	
	WASTE-L-B1-0-0.5FT	**0.83681**	
	WASTE-L-B2-0-0.5FT	**0.42085**	
	WASTE-L-B3-0-0.5FT	0 098685	
	WASTE-L-B4-0-0.5FT	0.11702	
	WASTE-N-B1-0-0.5FT	**0.39551**	
	WASTE-N-B2-0-0 5FT	0.08499	
	WASTE-N-B3-0-0.5FT	0.029154	
	WASTE-N-B4-0-0 5FT	0.068762	
	WASTE-N-B4-0-0.5FTFD	0.047294	
Total PCBs	Benchmark[1]	371	
ug/kg	Background[2]	1200	
	WASTE-H-B1-0-0.5FT	**1519**	
	WASTE-H-B4-0-0.5FT	1097	
	WASTE-I-B2-0-0 5FT	**121280**	
	WASTE-I-B3-0-0.5FT	**3418**	
	WASTE-L-B2-0-0 5FT	1171	

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints
[2]Twice average background soil concentration
[3]Calculated according to 1998 World Health Organization guidelines for mammals. Estimated *Maximum Potential Concentration treated as non-detects.*
Shading indicates concentration exceeds benchmark and background

Table 7-29a
Comparison of Site G Subsurface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent (mg/kg)	Number of Samples for Statistics	Maximum (mg/kg)	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration (mg/kg)	Soil Benchmark (mg/kg)[1]	Comment
1,1,2,2-Tetrachloroethane	1	5.81E-01	NC	no	NA		No comparison possible
1,2,4-Trichlorobenzene	4	1.20E+02	2.19E+05	no	NA	20	Maximum exceeds benchmark
1,2-Dichloroethane	1	4.35E-01	NC	no	NA		No comparison possible
1,4-Dichlorobenzene	2	3.56E+00	NC	no	NA	20	Maximum less than benchmark
2,4,6-Trichlorophenol	1	4.95E+01	NC	no	NA	4	Maximum exceeds benchmark
2,4-Dichlorophenol	3	1.41E+02	5.17E+07	no	NA		No comparison possible
2,4-Dinitrophenol	1	1.40E+01	NC	no	NA	20	Maximum less than benchmark
2-Butanone (MEK)	11	1.78E+01	1.08E+01	yes	ND		No benchmark; ND in background
2-Chlorophenol	1	8.76E+00	NC	no	NA		No comparison possible
2-Methylnapthalene	4	3.71E+01	1.04E+02	no	ND		No benchmark; ND in background
2-Methylphenol(o-cresol)	1	3.56E+00	NC	no	NA		No comparison possible
4,4'-DDE	4	1.35E+02	1.85E+08	no	1.61E-02		No benchmark; higher than background
4-Chloroaniline	3	2.31E+02	4.20E+22	no	NA		No comparison possible
4-Methyl-2-pentanone	4	6.00E+00	5.54E+02	no	NA		No comparison possible
Acenaphthene	1	2.67E+00	NC	no	ND	20	Maximum less than benchmark
Acetone	11	1.54E+01	8.44E+00	yes	ND		No benchmark; ND in background
Aluminum	13	1.87E+04	1.08E+04	yes	2.54E+04		No benchmark; within background
Anthracene	1	8.49E+00	NC	no	1.60E-01		No benchmark; higher than background
Arsenic	5	1.11E+01	1.37E+01	no	1.91E+01	9.9	Maximum exceeds benchmark
Barium	13	4.59E+04	4.18E+04	yes	3.63E+02	283	Maximum exceeds benchmark
Benzene	6	4.53E+01	2.88E+01	no	ND		No benchmark; ND in background
Benzyl alcohol	1	6.10E+00	NC	no	NA		No comparison possible
Butyl benzyl phthalate	1	2.33E+01	NC	no	ND		No benchmark; ND in background
Pentachlorophenol(PCP)	5	4.77E+03	3.34E+07	no	7.42E-01	3	Maximum exceeds benchmark
Cadmium	3	1.40E+01	6.65E+04	no	8.65E+00	4	Maximum exceeds benchmark
Calcium	2	1.85E+04	NC	no	3.35E+04		Low toxicity
Chlorobenzene	8	5.38E+02	1.18E+06	no	ND	40	Maximum exceeds benchmark
Chloroform	1	1.16E+01	NC	no	NA		No comparison possible
Chromium	13	9.85E+02	2.28E+02	yes	3.93E+01		No benchmark; higher than background
Chrysene	1	2.29E+01	NC	no	2.73E-01		No benchmark; higher than background
Cobalt	6	5.60E+01	5.25E+01	no	1.55E+01	20	Maximum exceeds benchmark
Copper	20	2.22E+03	3.24E+02	yes	2.09E+02	60	Maximum exceeds benchmark
Di-N-butylphthalate	4	1.76E+01	2.10E+11	no	3.12E-01	200	Maximum less than benchmark
Dibenzofuran	2	3.38E+01	1.12E+02	no	ND		No benchmark; ND in background
Diethylphthalate	1	2.29E+01	NC	no	1.87E-01	100	Maximum less than benchmark
Ethylbenzene	6	1.69E+01	7.35E+03	no	ND		No benchmark; ND in background
Fluoranthene	1	6.59E+00	NC	no	5.02E-01		No benchmark; higher than background
Fluorene	1	1.13E+01	NC	no	ND		No benchmark; ND in background
Hexachlorobenzene	2	4.06E+01	NC	no	NA		No comparison possible
Iron	22	5.37E+04	1.73E+04	yes	3.80E+04		No benchmark; within background
Lead	18	3.12E+03	7.30E+02	yes	1.85E+02	40.5	Maximum exceeds benchmark
Magnesium	2	7.46E+03	NC	no	1.72E+04		Low toxicity
Manganese	11	4.61E+02	2.75E+02	yes	8.83E+02		No benchmark; within background
Mercury	4	3.43E+01	3.78E+21	no	1.77E-01		No benchmark; higher than background
Methylene chloride	11	7.11E+00	4.29E+03	no	1.14E-02		No benchmark; higher than background
N-Nitrosodiphenylamine	1	1.78E+02	NC	no	NA		No comparison possible
Naphthalene	7	5.43E+03	9.78E+06	no	ND		No benchmark; ND in background
Nickel	19	3.99E+02	7.98E+01	yes	4.27E+01	30	Maximum exceeds benchmark
Phenanthrene	4	5.14E+01	1.18E+02	no	3.35E-01		No benchmark; higher than background
Phenol	1	1.78E+02	NC	no	NA	30	Maximum exceeds benchmark
Phosphorus	9	1.34E+03	8.98E+02	yes	NA		Low toxicity
Potassium	2	1.70E+03	2.31E+03	no	4.73E+03		Low toxicity
Pyrene	2	1.91E+01	NC	no	4.35E-01		No benchmark; higher than background
Silver	1	1.20E+01	NC	no	1.35E+00	2	Maximum exceeds benchmark
Total PCBs	7	4.43E+03	6.93E+16	no	1.20E+00	0.371	Maximum exceeds benchmark
Tetrachloroethene	8	5.86E+01	3.30E+01	yes	NA		No comparison possible
Tin	2	8.00E+01	NC	no	NA	50	Maximum exceeds benchmark
Toluene	6	1.18E+02	8.71E+01	no	ND	200	Maximum less than benchmark
Total Xylenes	6	4.15E+01	1.36E+06	no	ND		No benchmark; ND in background
Trichloroethene	4	3.85E+00	1.85E+01	no	ND		No benchmark; ND in background
Vanadium	11	1.32E+03	4.44E+02	yes	6.90E+01	2	Maximum exceeds benchmark
Zinc	19	4.26E+03	1.02E+03	yes	8.08E+02	8.5	Maximum exceeds benchmark
trans-1,2-Dichloroethene	1	7.00E-01	NC	no	NA		No comparison possible

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

Yellow shading indicates maximum site concentration exceeds benchmark.

Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil) and no benchmark is available.

NC= value was not calculated

NA= background soil concentrations were not available for these constituents

Table 7-29b
Comparison of Site H Subsurface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent (mg/kg)	Number of Samples for Statistics	Maximum (mg/kg)	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration (mg/kg)	Soil Benchmark (mg/kg)[1]	Comment
1,2,4-Trichlorobenzene	6	7.58E+03	4.42E+22	no	NA	20	Maximum exceeds benchmark
1,2-Dichlorobenzene	3	1.94E+04	1.38E+134	no	NA		No comparison possible
1,2-Dichloroethane	1	1.20E-02	NC	no	NA		No comparison possible
1,3-Dichlorobenzene	3	2.42E+02	1.28E+17	no	NA		No comparison possible
1,4-Dichlorobenzene	5	3.06E+04	8.14E+38	no	NA	20	Maximum exceeds benchmark
2,4,6-Trichlorophenol	2	6.13E+02	NC	no	NA	4	Maximum exceeds benchmark
2,4-Dichlorophenol	5	7.42E+02	2.30E+17	no	NA		No comparison possible
2,4-Dimethylphenol	1	9.20E-02	NC	no	NA		No comparison possible
2-Butanone (MEK)	5	2.72E+01	2.51E+01	no	ND		No benchmark; ND in background
2-Methylnaphthalene	3	3.47E+02	1.00E+82	no	ND		No benchmark; ND in background
4,4'-DDE	2	7.80E-01	1.51E+00	no	1.61E-02		No benchmark; higher than background
4,4'-DDT	2	9.23E-01	1.30E+00	no	1.41E-02		No benchmark; higher than background
4-4'-DDD	1	4.31E-01	NC	no	ND		No benchmark; ND in background
4-Methyl-2-pentanone	4	7.85E+00	1.90E+15	no	NA		No comparison possible
4-Methylphenol	1	1.72E-01	NC	no	NA		No comparison possible
4-Nitroaniline	1	1.83E+03	NC	no	NA		No comparison possible
Acenaphthylene	3	3.78E+02	4.03E+84	no	ND		No benchmark; ND in background
Acetone	11	2.11E+01	1.58E+03	no	ND		No benchmark; ND in background
Aluminum	11	1.21E+04	1.08E+04	yes	2.54E+04		No benchmark; within background
Anthracene	4	6.80E+02	1.80E+34	no	1.60E-01		No benchmark; higher than background
Arsenic	2	2.60E+01	NC	no	1.91E+01	9.9	Maximum exceeds benchmark
Barium	11	3.24E+03	5.87E+03	no	3.63E+02	283	Maximum exceeds benchmark
Benzene	7	6.13E+01	1.27E+12	no	ND		No benchmark; ND in background
Benzo(a)anthracene	3	3.78E+02	9.26E+60	no	2.40E-01		No benchmark; higher than background
Benzo(a)pyrene	2	2.72E+02	NC	no	1.87E-01		No benchmark; higher than background
Benzo(b)fluoranthene	3	2.11E+02	1.37E+50	no	1.79E-01		No benchmark; higher than background
Benzo(g,h,i)perylene	2	1.13E+02	NC	no	1.27E-01		No benchmark; higher than background
Benzoic acid	2	2.64E+00	NC	no	NA		No comparison possible
Benzyl alcohol	1	7.92E+00	NC	no	NA		No comparison possible
Cadmium	4	2.94E+02	3.36E+02	no	8.65E+00	4	Maximum exceeds benchmark
Chlorobenzene	6	4.52E+02	2.94E+17	no	ND	40	Maximum exceeds benchmark
Chloroform	2	1.92E-01	5.61E-01	no	NA		No comparison possible
Chromium	8	1.00E+02	6.37E+02	no	3.93E+01		No benchmark; higher than background
Chrysene	3	3.32E+02	5.95E+47	no	2.73E-01		No benchmark; higher than background
Cobalt	5	1.05E+02	7.44E+03	no	1.55E+01	20	Maximum exceeds benchmark
Copper	8	2.44E+03	1.74E+06	no	2.09E+02	60	Maximum exceeds benchmark
Cyanide	2	2.00E+00	NC	no	NA		No comparison possible
Di-N-butyl phthalate	8	2.57E+01	2.84E+01	no	3.12E-01	200	Maximum less than benchmark
Dibenzofuran	4	6.04E+01	2.26E+15	no	ND		No benchmark; ND in background
Dibenzo(a,h)anthracene	1	3.17E+01	NC	no	ND		No benchmark; ND in background
Ethylbenzene	3	1.28E+01	1.63E+01	no	ND		No benchmark; ND in background
Fluoranthene	4	1.33E+03	8.60E+34	no	5.02E-01		No benchmark; higher than background
Fluorene	3	4.83E+02	7.75E+78	no	ND		No benchmark; ND in background
Hexachlorobenzene	1	7.14E-01	NC	no	NA		No comparison possible
Ideno(1,2,3-cd)pyrene	1	1.36E+02	NC	no	ND		*No benchmark; ND in background*
Iron	11	8.45E+04	4.98E+05	no	3.80E+04		No benchmark; higher than background
Lead	2	1.15E+03	NC	no	1.85E+02	40.5	Maximum exceeds benchmark
Manganese	11	3.65E+04	2.74E+06	no	8.83E+02		No benchmark; higher than background
Mercury	3	3.90E+00	1.78E+03	no	1.77E-01		No benchmark; higher than background
Methylene chloride	11	5.56E+01	8.47E+03	no	1.14E-02		No benchmark; higher than background
N-Nitrosodiphenylamine	1	1.00E-07	NC	no	NA		No comparison possible
Naphthalene	4	2.27E+03	1.59E+44	no	ND		No benchmark; ND in background
Nickel	10	1.51E+04	3.57E+06	no	4.27E+01	30	Maximum exceeds benchmark
Phenanthrene	6	2.11E+03	3.01E+14	no	3.35E-01		No benchmark; higher than background
Phenol	1	4.22E-01	NC	no	NA	30	Maximum less than benchmark
Pyrene	3	6.64E+02	5.05E+63	no	4.35E-01		No benchmark; higher than background
Selenium	1	2.00E+00	NC	no	ND	0.21	Maximum exceeds benchmark
Silver	2	4.40E+01	NC	no	1.35E-03	2	Maximum exceeds benchmark
Total PCBs	7	1.80E+04	5.45E+15	no	1.20E+00	0.371	Maximum exceeds benchmark
Tetrachloroethene	1	5.65E+00	NC	no	NA		No comparison possible
Thallium	1	1.00E+00	NC	no	ND	1	Maximum within benchmark
Tin	3	1.11E+02	1.05E+07	no	NA	50	Maximum exceeds benchmark
Toluene	5	7.65E+01	2.05E+10	no	ND	200	Maximum less than benchmark
Total Xylenes	3	2.36E+01	*3.46E+01*	no	*ND*		*No benchmark; ND in background*
Trichloroethene	1	1.00E-02	NC	no	ND		No benchmark; ND in background
Vanadium	6	9.50E+01	1.97E+02	no	6.90E+01	2	Maximum exceeds benchmark
Zinc	11	3.95E+04	1.61E+07	no	8.08E+02	8.5	Maximum exceeds benchmark
bis(2-ethylhexyl)phthalate	4	6.14E-01	1.10E+00	no	3.22E-01		No benchmark; higher than background

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

Yellow shading indicates maximum site concentration exceeds benchmark.

Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil) and no benchmark is available.

NC= value was not calculated

NA= background soil concentrations were not available for these constituents

Table 7-29c
Comparison of Site I Subsurface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent (mg/kg)	Number of Samples for Statistics	Maximum (mg/kg)	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration (mg/kg)	Soil Benchmark (mg/kg)[1]	Comment
1,1,1-Trichloroethane	2	1.69E+00	NC	no	NA		No comparison possible
1,2,4-Trichlorobenzene	8	8.26E+03	1.17E+06	no	NA	20	Maximum exceeds benchmark
1,2-Dichlorobenzene	6	3.24E+02	7.93E+04	no	NA		No comparison possible
1,3-Dichlorobenzene	2	7.01E+01	NC	no	NA		No comparison possible
1,4-Dichlorobenzene	8	1.84E+03	1.26E+05	no	NA	20	Maximum exceeds benchmark
2,4-Dichlorophenol	1	9.00E+00	NC	no	NA		No comparison possible
2-Butanone (MEK)	15	1.69E+01	9.61E+00	yes	ND		No benchmark; ND in background
2-Methylnapthalene	7	1.69E+02	2.64E+03	no	ND		No benchmark; ND in background
4,4'-DDT	1	4.31E+00	NC	no	1.41E-02		No benchmark; higher than background
4-4'-DDD	2	2.97E+01	NC	no	ND		No benchmark; ND in background
4-Chloroaniline	1	4.32E+01	NC	no	NA		No comparison possible
4-Methyl-2-pentanone	2	4.16E+00	NC	no	NA		No comparison possible
Acenapthene	1	1.40E+01	NC	no	ND	20	Maximum less than benchmark
Acetone	16	1.69E+01	2.17E+01	no	ND		No benchmark; ND in background
Aluminum	16	1.35E+04	7.92E+03	yes	2.54E+04		No benchmark; within background
Anthracene	2	2.03E+02	NC	no	1.60E-01		No benchmark; higher than background
Antimony	3	6.66E+03	5.78E+53	no	3.80	5	Maximum exceeds benchmark
Arsenic	9	1.40E+01	2.05E+01	no	1.91E+01	9.9	Maximum exceeds benchmark
Barium	10	3.60E+03	4.82E+04	no	3.63E+02	283	Maximum exceeds benchmark
Benzene	10	2.41E+01	2.34E+02	no	ND		No benchmark; ND in background
Benzo(a)anthracene	2	6.72E+00	NC	no	2.40E-01		No benchmark; higher than background
Benzo(a)pyrene	1	2.47E+00	NC	no	1.87E-01		No benchmark; higher than background
Benzo(b)fluoranthene	2	3.24E+01	NC	no	1.79E-01		No benchmark; higher than background
Benzoic acid	1	6.21E+01	NC	no	NA		No comparison possible
Beryllium	1	1.53E+03	NC	no	1.51E+00	10	Maximum exceeds benchmark
Butyl benzyl phthalate	1	1.39E+02	NC	no	ND		No benchmark; ND in background
Pentachlorophenol(PCP)	1	1.92E+02	NC	no	7.42E-01	3	Maximum exceeds benchmark
Cadmium	7	1.30E+01	1.84E+01	no	8.65E+00	4	Maximum exceeds benchmark
Chlorobenzene	12	1.27E+02	7.16E+04	no	ND	40	Maximum exceeds benchmark
Chromium	14	7.31E+02	3.60E+02	yes	3.93E+01		No benchmark; higher than background
Chrysene	2	5.59E+00	9.88E+00	no	2.73E-01		No benchmark; higher than background
Cobalt	7	1.40E+02	1.05E+02	no	1.55E+01	20	Maximum exceeds benchmark
Copper	8	6.30E+02	2.10E+03	no	2.09E+02	60	Maximum exceeds benchmark
Cyanide	3	3.18E+03	1.14E+80	no	NA		No comparison possible
Di-N-butyl phthalate	8	2.03E+02	3.15E+04	no	3.12E-01	200	Maximum exceeds benchmark
Dibenzofuran	1	5.59E+00	NC	no	ND		No benchmark; ND in background
Diethylphthalate	1	1.69E+01	NC	no	1.87E-01	100	Maximum less than benchmark
Ethylbenzene	10	1.51E+01	1.14E+02	no	ND		No benchmark; ND in background
Fluoranthene	3	2.03E+02	3.81E+13	no	5.02E-01		No benchmark; higher than background
Fluorene	3	3.54E+01	7.33E+08	no	ND		No benchmark; ND in background
Hexachlorobenzene	7	1.27E+03	2.10E+03	no	NA		No comparison possible
Hexachloroethane	1	3.01E+00	NC	no	NA		No comparison possible
Iron	16	4.15E+04	3.11E+04	yes	3.80E+04		No benchmark; within background
Lead	15	2.33E+04	3.08E+05	no	1.85E+02	40.5	Maximum exceeds benchmark
Manganese	1	9.80E+01	NC	no	8.83E+02		No benchmark; within background
Mercury	5	3.20E+00	2.69E+00	no	1.77E-01		No benchmark; higher than background
Methylene chloride	16	6.77E+00	1.64E+02	no	1.14E-02		No benchmark; higher than background
N-Nitrosodiphenylamine	2	1.00E+02	NC	no	NA		No comparison possible
Naphthalene	7	5.15E+02	5.75E+05	no	ND		No benchmark; ND in background
Nickel	12	2.41E+03	2.50E+04	no	4.27E+01	30	Maximum exceeds benchmark
Phenanthrene	5	1.02E+02	6.24E+04	no	3.35E-01		No benchmark; higher than background
Phenol	2	2.70E+01	NC	no	NA	30	Maximum less than benchmark
Pyrene	4	4.93E+01	8.42E+05	no	4.35E-01		No benchmark; higher than background
Selenium	1	1.32E+03	NC	no	ND	0.21	Maximum exceeds benchmark
Total PCBs	5	3.43E+02	3.06E+02	no	1.20E+00	0.371	Maximum exceeds benchmark
Tetrachloroethene	5	5.27E+00	1.81E+01	no	NA		No comparison possible
Tin	9	5.50E+01	1.15E+02	no	NA	50	Maximum exceeds benchmark
Toluene	11	7.79E+01	4.10E+02	no	ND	200	Maximum less than benchmark
Total Xylenes	10	1.92E+01	2.70E+02	no	ND		No benchmark; ND in background
Toxaphene	1	4.93E+02	NC	no	NA		No comparison possible
Trichloroethene	2	3.81E+00	1.22E+01	no	ND		No benchmark; ND in background
Vanadium	7	5.53E+02	8.22E+02	no	6.90E+01	2	Maximum exceeds benchmark
Zinc	16	6.33E+03	5.00E+03	yes	8.08E+02	8.5	Maximum exceeds benchmark
bis(2-ethylhexyl)phthalate	7	1.31E+02	7.45E+02	no	3.22E-01		No benchmark; higher than background
trans-1,2-Dichloroethene	1	3.00E-03	NC	no	NA		No comparison possible

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

Yellow shading indicates maximum site concentration exceeds benchmark.
Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil) and no benchmark was available.
NC= value was not calculated
NA= background soil concentrations were not available for these constituents

Table 7-29d
Comparison of Site L Subsurface Soil Concentrations to Ecological Benchmarks
Sauget Area I

Constituent (mg/kg)	Number of Samples for Statistics	Maximum (mg/kg)	95% UCL	95% UCL Represents Site Concentration	Twice Average Background Soil Concentration (mg/kg)	Soil Benchmark (mg/kg)[1]	Comment
1,2,4-Trichlorobenzene	3	7.90E+01	1.21E+02	no	NA	20	Maximum exceeds benchmark
1,2-Dichlorobenzene	4	7.70E+00	7.23E+00	no	NA		No comparison possible
1,3-Dichlorobenzene	1	4.30E+00	NC	no	NA		No comparison possible
1,4-Dichlorobenzene	9	1.00E+02	1.29E+07	no	NA	20	Maximum exceeds benchmark
2,4,6-Trichlorophenol	1	1.50E+00	NC	no	NA	4	Maximum less than benchmark
2,4-Dichlorophenol	2	1.10E+01	NC	no	NA		No comparison possible
2-Butanone (MEK)	3	1.00E+01	6.98E+61	no	ND		No benchmark; ND in background
2-Chlorophenol	3	2.60E+00	3.92E+00	no	NA		No comparison possible
2-Methylnapthalene	6	3.10E+00	2.36E+00	no	ND		No benchmark; ND in background
4-Chloroaniline	6	2.70E+02	2.89E+14	no	NA		No comparison possible
4-Methyl-2-pentanone	4	1.67E-01	1.49E+02	no	NA		No comparison possible
4-Methylphenol	5	7.10E+00	6.19E+00	no	NA		No comparison possible
Acenapthene	3	3.10E+00	3.47E+23	no	ND	20	Maximum less than benchmark
Acenapthylene	1	2.80E-01	NC	no	ND		No benchmark; ND in background
Acetone	6	4.56E+00	2.30E+04	no	ND		No benchmark; ND in background
Aluminum	11	1.28E+04	7.82E+03	yes	2.54E+04		No benchmark; within background
Anthracene	3	4.20E+00	3.58E+31	no	1.60E-01		No benchmark; higher than background
Antimony	1	3.20E+01	NC	no	3.80E+00	5	Maximum exceeds benchmark
Arsenic	10	1.72E+02	4.08E+02	no	1.91E+01	9.9	Maximum exceeds benchmark
Barium	15	1.44E+03	5.47E+04	no	3.63E+02	283	Maximum exceeds benchmark
Benzene	5	5.70E+00	6.67E+13	no	ND		No benchmark; ND in background
Benzo(a)anthracene	4	8.60E+00	9.54E+08	no	2.40E-01		No benchmark; higher than background
Benzo(a)pyrene	3	5.30E+00	8.81E+35	no	1.87E-01		No benchmark; higher than background
Benzo(b)fluoranthene	3	5.40E+00	2.48E+24	no	1.79E-01		No benchmark; higher than background
Benzo(g,h,I)perylene	1	2.70E-02	NC	no	1.27E-01		No benchmark; within background
Benzo(k)fluoranthene	1	4.60E+00	NC	no	2.08E-01		No benchmark; higher than background
Benzoic acid	2	3.20E+00	NC	no	NA		No comparison possible
Butyl benzyl phthalate	1	5.40E+00	NC	no	ND		No benchmark; ND in background
Pentachlorophenol(PCP)	4	5.82E+01	2.13E+02	no	7.42E-01	3	Maximum exceeds benchmark
Cadmium	6	4.20E+01	1.32E+10	no	8.65E+00	4	Maximum exceeds benchmark
Calcium	6	7.55E+04	6.01E+04	no	3.35E+04		Low toxicity
Chlorobenzene	8	5.30E+00	2.41E+03	no	ND	40	Maximum less than benchmark
Chloroform	3	2.03E+01	2.66E+48	no	NA		No comparison possible
Chromium	10	2.70E+01	2.36E+01	yes	3.93E+01		No benchmark; within background
Chrysene	4	8.20E+00	7.34E+08	no	2.73E-01		No benchmark; higher than background
Cobalt	7	9.00E+00	8.67E+00	no	1.55E+01	20	Maximum less than benchmark
Copper	10	3.08E+02	4.33E+02	no	2.09E+02	60	Maximum exceeds benchmark
Cresol(m,p)	*4*	*1.90E-01*	*2.58E-01*	*no*	*NA*		*No comparison possible*
Cyanide	1	4.60E-01	NC	no	NA		No comparison possible
Di-N-butyl phthalate	4	2.78E+00	3.15E+03	no	3.12E-01	200	Maximum less than benchmark
Dibenzofuran	2	3.00E+00	NC	no	ND		No benchmark; ND in background
Diethylphthalate	2	1.00E+00	NC	no	1.87E-01	100	Maximum less than benchmark
Ethylbenzene	1	4.00E-02	NC	no	ND		No benchmark; ND in background
Fluoranthene	4	1.60E+01	2.05E+09	no	5.02E-01		No benchmark; higher than background
Fluorene	2	5.00E+00	NC	no	ND		No benchmark; ND in background
Hexachlorobenzene	1	4.80E+00	NC	no	NA		No comparison possible
Hexachloroethane	1	4.90E-02	NC	no	NA		No comparison possible
Ideno(1,2,3-cd)pyrene	2	2.90E+00	NC	no	ND		No benchmark; ND in background
Iron	11	2.40E+04	1.45E+04	yes	3.80E+04		No benchmark; within background
Lead	*13*	*6.64E+02*	*5.83E+03*	*no*	*1.85E+02*	*40.5*	*Maximum exceeds benchmark*
Magnesium	6	9.44E+03	7.92E+03	no	1.72E+04		No benchmark; within background
Manganese	11	7.82E+02	3.68E+03	no	8.83E+02		No benchmark; within than background
Mercury	7	1.80E+00	6.02E+01	no	1.77E-01		No benchmark; higher than background
Methylene chloride	5	2.28E+00	5.92E+07	no	1.14E-02		No benchmark; higher than background
Naphthalene	4	7.30E+00	7.72E+06	no	ND		No benchmark; ND in background
Nickel	10	2.39E+03	2.67E+03	no	4.27E+01	30	Maximum exceeds benchmark
Phenanthrene	5	2.30E+01	1.33E+06	no	3.35E-01		No benchmark; higher than background
Phenol	5	1.60E+01	1.57E+01	no	NA	30	Maximum less than benchmark
Potassium	6	2.28E+03	1.86E+03	no	4.73E+03		No benchmark; within background
Pyrene	4	2.30E+01	3.48E+10	no	4.35E-01		No benchmark; higher than background
Total PCBs	2	5.00E+02	NC	no	1.20E+00	0.371	Maximum exceeds benchmark
Toluene	7	4.00E+02	3.21E+09	no	ND	200	Maximum exceeds benchmark
Total Xylenes	4	1.10E+01	2.48E+06	no	ND		No benchmark; ND in background
Vanadium	9	1.31E+02	7.51E+01	yes	6.90E+01	2	Maximum exceeds benchmark
Zinc	11	4.24E+03	1.61E+04	no	8.08E+02	8.5	Maximum exceeds benchmark
bis(2-ethylhexyl)phthalate	6	2.20E+00	1.61E+00	no	3.22E-01		No benchmark; higher than background

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints

Yellow shading indicates maximum site concentration exceeds benchmark.

Green shading indicates upper 95% UCL concentration (or maximum if 95% UCL not available) exceeds twice average background concentration (or constituent was not detected in background soil) and no benchmark available.

NC= value was not calculated

NA= background soil concentrations were not available for these constituents

Table 8-1
Weight of Evidence Evaluation of Ecological Risk
Sauget Area I

Harm/Magnitude	Assessment Endpoint 1			Assessment Endpoint 2			Assessment Endpoint 3			Assessment Endpoint 4		
	Sustainability of warm water fish			*Survival, growth, and reproduction of aquatic wildlife species*			*Survival, growth, and reproduction of bald eagles*			*Survival, growth, and reproduction of terrestrial wildlife in floodplain*		
	Weighing Factors (Increasing Confidence or Weight) →			**Weighing Factors** (Increasing Confidence or Weight) →			**Weighing Factors** (Increasing Confidence or Weight) →			**Weighing Factors** (Increasing Confidence or Weight) →		
	Low Weight	Medium Weight	High Weight	Low Weight	Medium Weight	High Weight	Low Weight	Medium Weight	High Weight	Low Weight	Medium Weight	High Weight
Yes/High												
Yes/Low	**1c** - COPCs exceed sediment guidelines for benthic invertebrates	**1a** - fish body burdens indicate exposure to site-related COPCs **1a** - mercury concentrations in some fish exceed toxic benchmark **1c** - sediments exhibit toxicity (similar to other water bodies in region)		**2d** - food chain modeling indicated potential risk to great blue heron that eats Borrow Pit Lake fish due to mercury **2e** food chain modeling indicated potential risk to muskrat that eats snails from CS-F due to aluminum, antimony, copper, and dioxin (based on BAF modeling) **2e** food chain modeling indicated potential risk to tree swallow that eats aquatic insects from CS-F and Borrow Pit Lake due to aluminum, chromium, mercury, zinc, PCBs, DDT, copper, and dioxin (based on BAF modeling)	**2b, 2d, 2e** - concentrations in plants, fish, clams, and shrimp indicate exposure to site-related COPCs			**3a** - concentrations in fish indicate potential exposure to site-related COPCs - measure of exposure rather than effect		**4a** - concentratons of COPCs in surface soil exceed some screening benchmarks		
Undetermined												
No Risk		**1c** - benthic community reflects available habitat	**1b** - COPCs that exceed surface water criteria are soil constituents (Al, Ba, Fe, Mn) and likely to be due to entrained sediment	**2a** - species use of habitat is high **2b, 2e** - food chain *modeling indicated* no risk to mallards that eat plants or snails (CS-F); risks to muskrats eating plants (CS-F) and clams (BPL) due to aluminum is indistinguishable from background risks **2d, 2e** - food chain modeling indicated no risk to river otter that eats fish (CS-F and BPL) or clams (BPL); *no risk to mallard that* eats shrimp (BPL); no risk to heron that eat CS F fish (based on BAF modeling)	**2c** - surface water concentratons do not present a risk to wildlife		**3a** - food chain modeling indicated no risk to bald eagles eating fish from Borrow Pit or Dead Creek Section F					

Line of Evidence Category Key	
	FIELD OBSERVATIONS
	LABORATORY
	LITERATURE
	MODELING

FIGURES

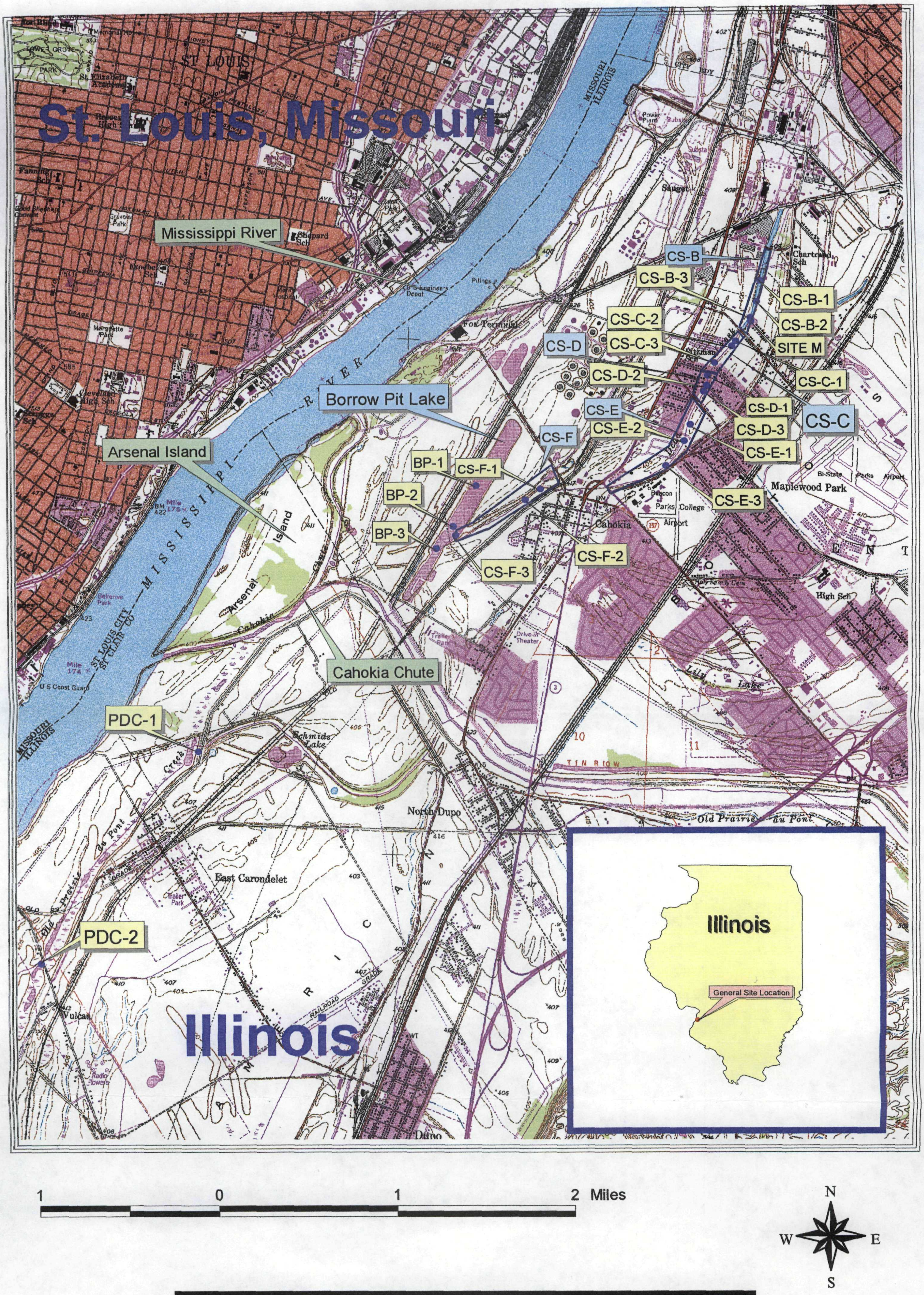


Figure 1-1: Site Locus and Sample Locations
Sauget Area 1
Sauget, Illinois

Figure 2-1: Dead Creek Section F and Borrow Pit Lake
Sauget Area 1
Sauget, Illinois

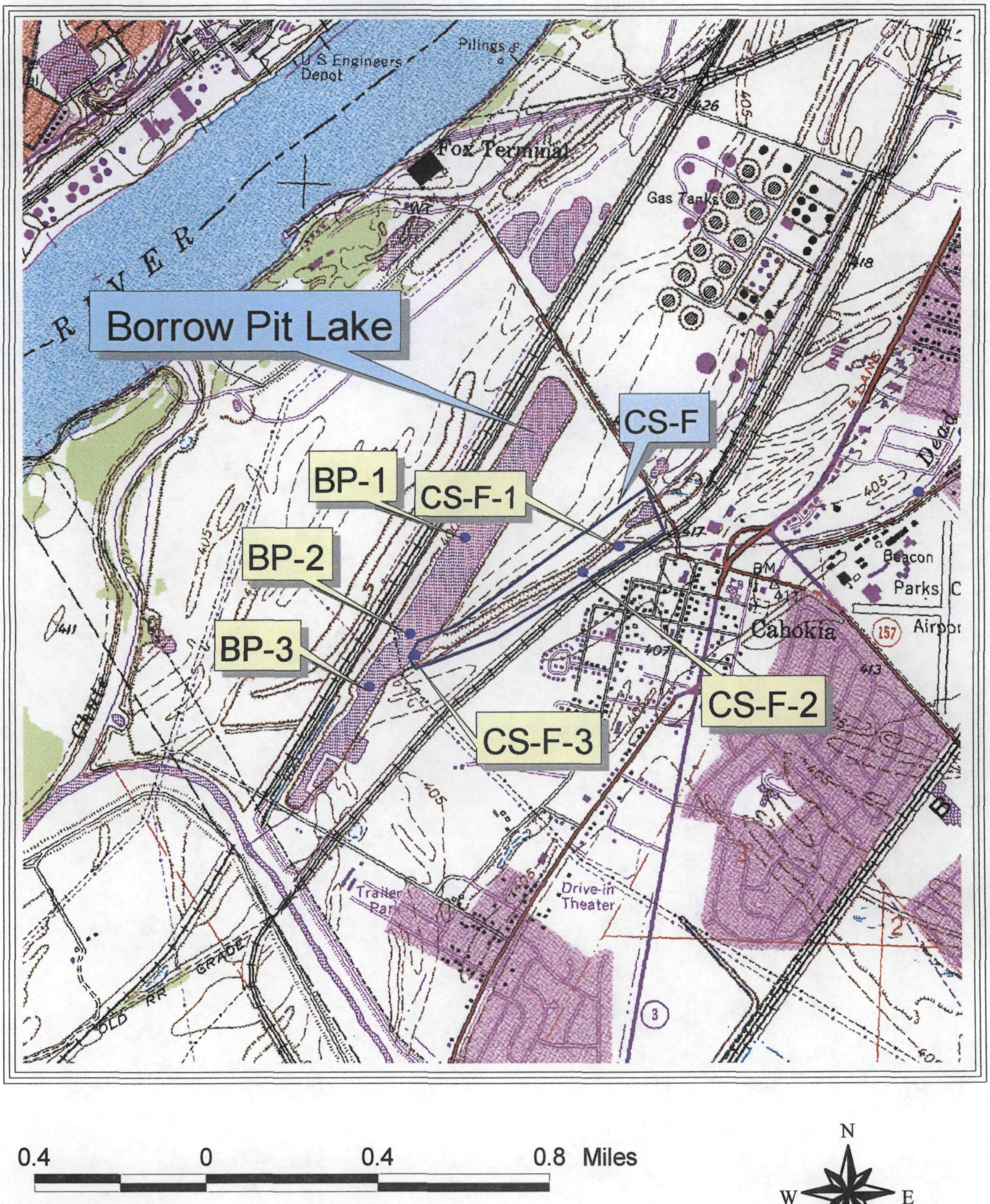


Figure 2-2: Reference Area Locus
Sauget Area 1
Sauget, Illinois

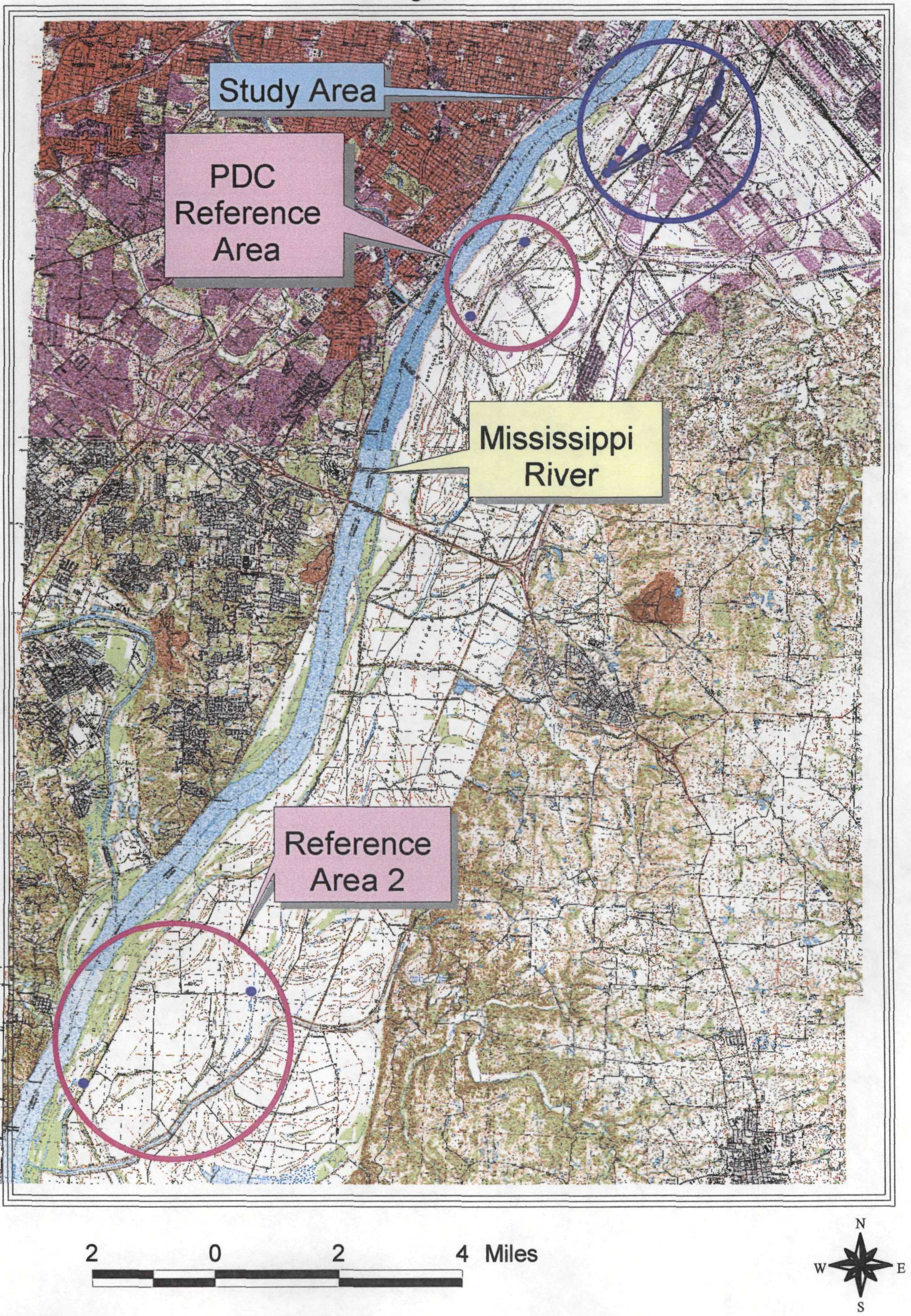


Figure 2-3: Monroe County Reference Areas
Sauget Area 1
Sauget, Illinois

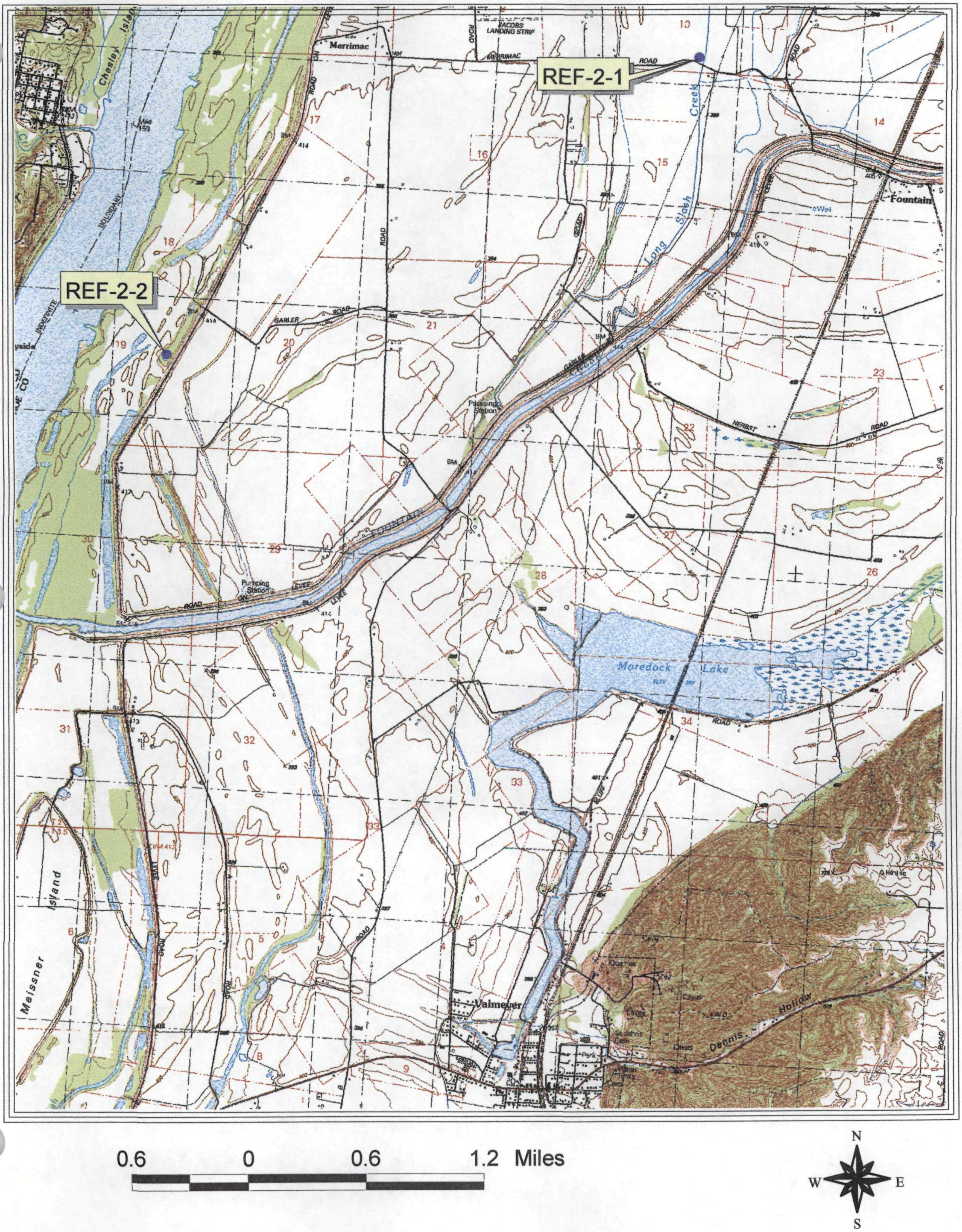
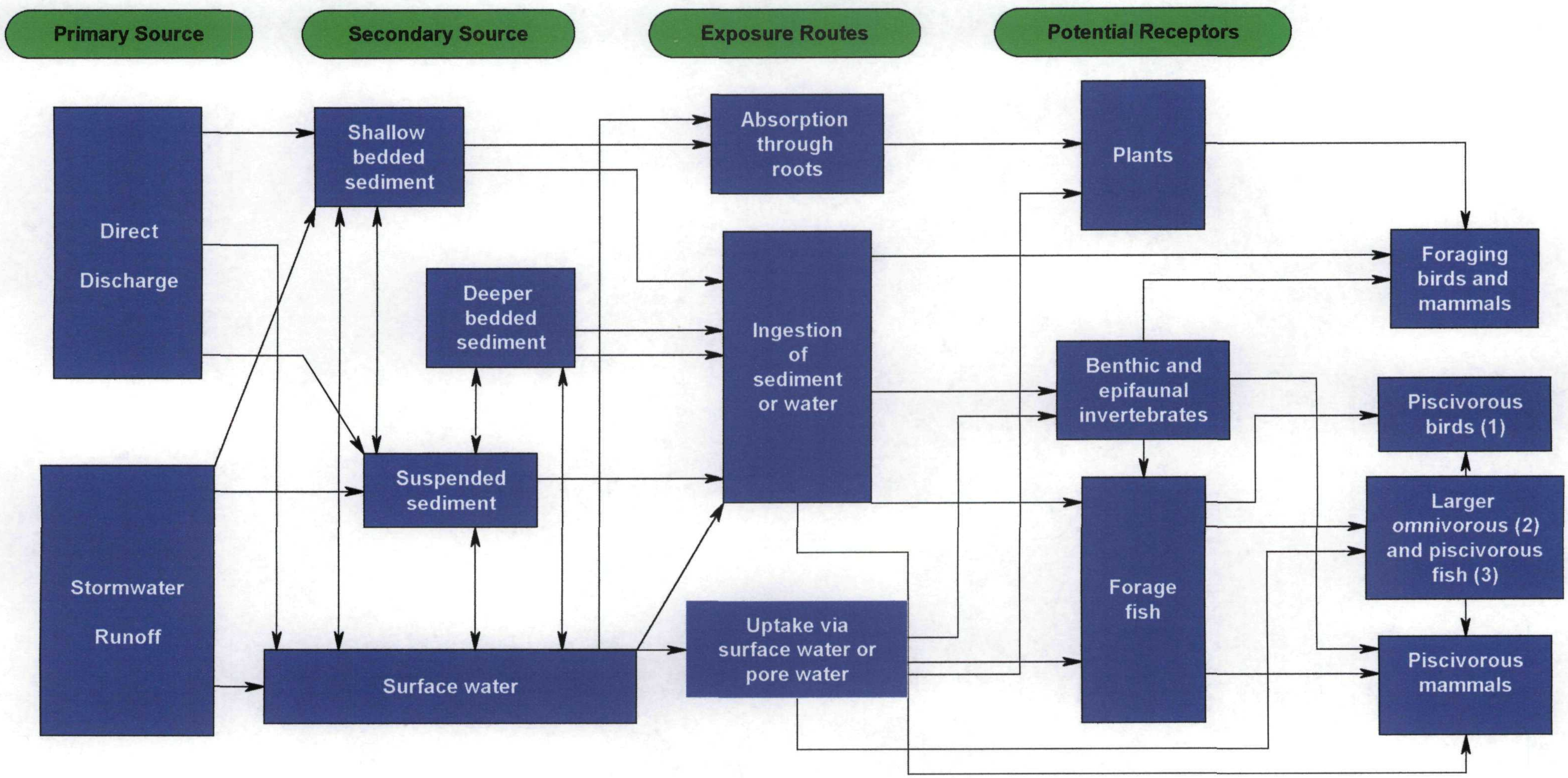


Figure 3-1: Ecological Conceptual Site Model for Dead Creek and Borrow Pit Lake
Sauget Area I
Sauget, Illinois



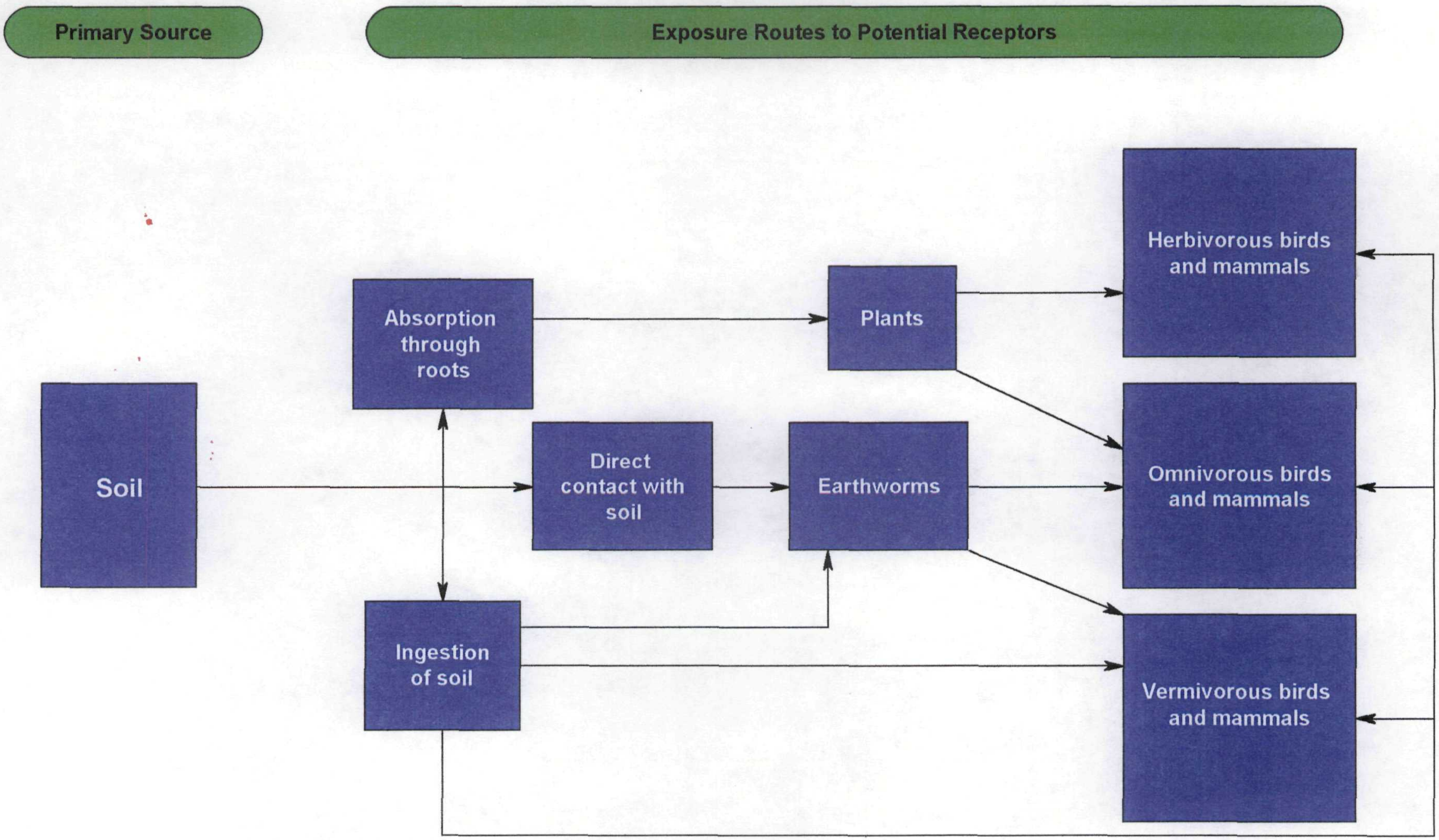
Note: This is a conceptual model that gives an overall view of potential fate and transport of COPCs and potential routes of exposure. It is not intended to represent every exposure that could possibly occur at the site. Other possible routes of exposure not depicted are:

1. Piscivorous birds could be exposed via ingestion of surface water.

2. Omnivorous fish could be exposed via incidental ingestion of sediment and ingestion of aquatic plants.

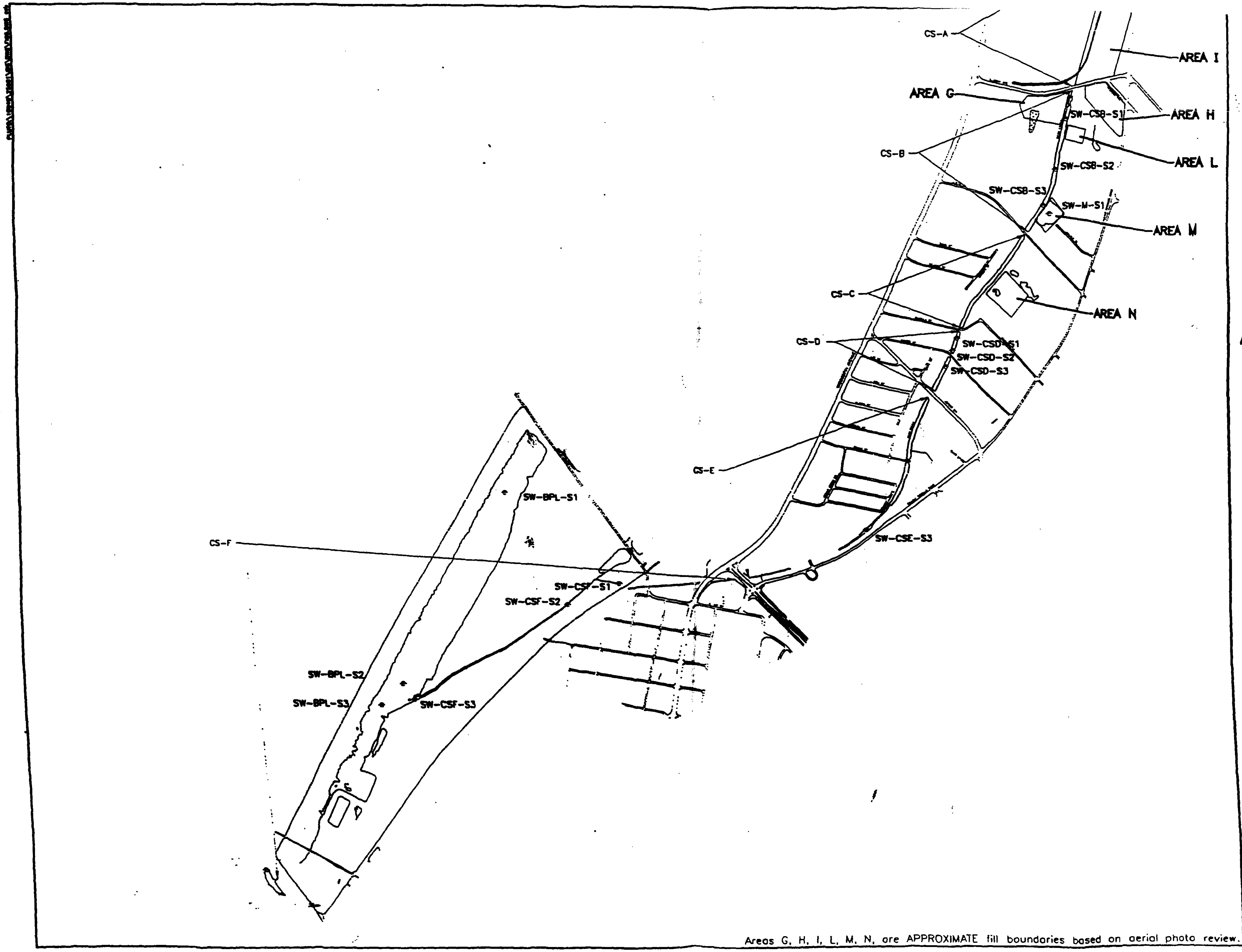
3. Piscivorous fish could be exposed via incidental ingestion of sediment.

Figure 3-2: Ecological Conceptual Site Model for Terrestrial Receptors and Dead Creek Floodplains
Sauget Area I
Sauget, Illinois



Note: Screening levels (Efroymson et al., 1997) also take into account exposure of carnivorous mammals and raptors via ingestion of small herbivorous and vermivorous mammals.

FIGURE 5-1



LEGEND

- ◆ SURFACE WATER SAMPLING LOCATION
- CS-A CREEK SEGMENT
- AREA H FILL AREA
- WATER BODY

SOLUTIA INC.
REMEDIATION TECHNOLOGY GROUP
ST. LOUIS, MISSOURI

SAUGET AREA 1
SUPPORT SAMPLING PLAN
SAUGET AND CAHOKIA, ILLINOIS

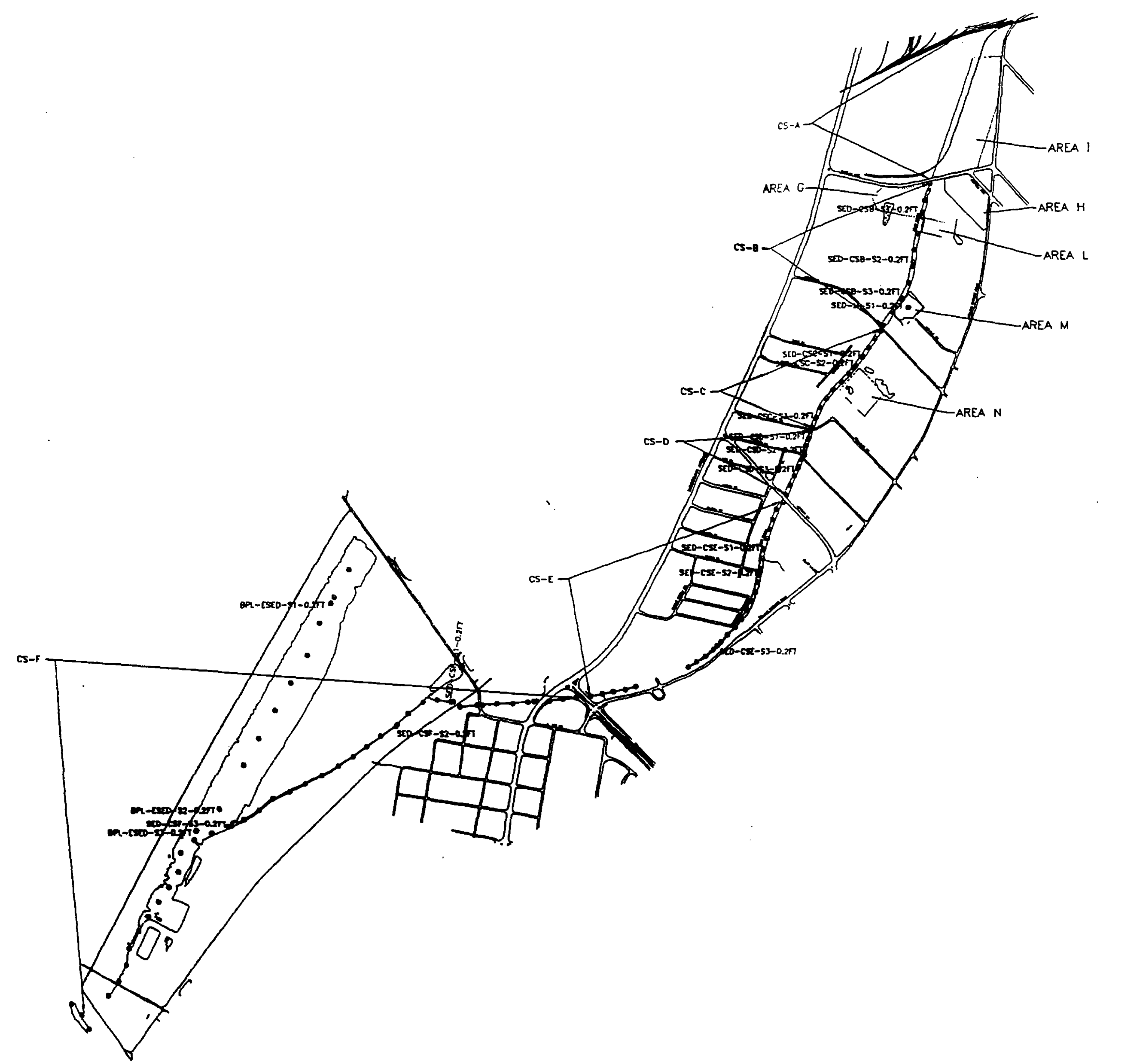
SURFACE WATER SAMPLE LOCATIONS

600 0 600
SCALE IN FEET

FILE NO. 25501.FIGS
SEPTEMBER 2000

O'BRIEN & GERE ENGINEERS, INC.

Figure 5-2



Areas G, H, I, L, M, N are APPROXIMATE fill boundaries based on aerial photo review.

LEGEND
- SEDIMENT SAMPLE LOCATION
CS-A CREEK SEGMENT
AREA H FILL AREA
WATER BODY

SOLUTIA INC.
REMEDIATION TECHNOLOGY GROUP
ST. LOUIS, MISSOURI

SAUGET AREA 1
SUPPORT SAMPLING PLAN
SAUGET AND CAHOKIA, ILLINOIS

Ecological
SEDIMENT
SAMPLE LOCATIONS

600 0 600
SCALE IN FEET

FILE NO. 25501.FIG4
SEPTEMBER 2000

O'BRIEN & GERE ENGINEERS, INC.

Figure 5-3 Industry Specific

SEDIMENT SAMPLE LOCATIONS

600 0 600
SCALE IN FEET

FILE NO. 25501.FIG4
SEPTEMBER 2000

O'BRIEN & GERE ENGINEERS, INC.

SAUGET AREA 1
SUPPORT SAMPLING PLAN
SAUGET AND CAHOKIA, ILLINOIS

SOLUTIA INC.
REMEDIATION TECHNOLOGY GROUP
ST. LOUIS, MISSOURI

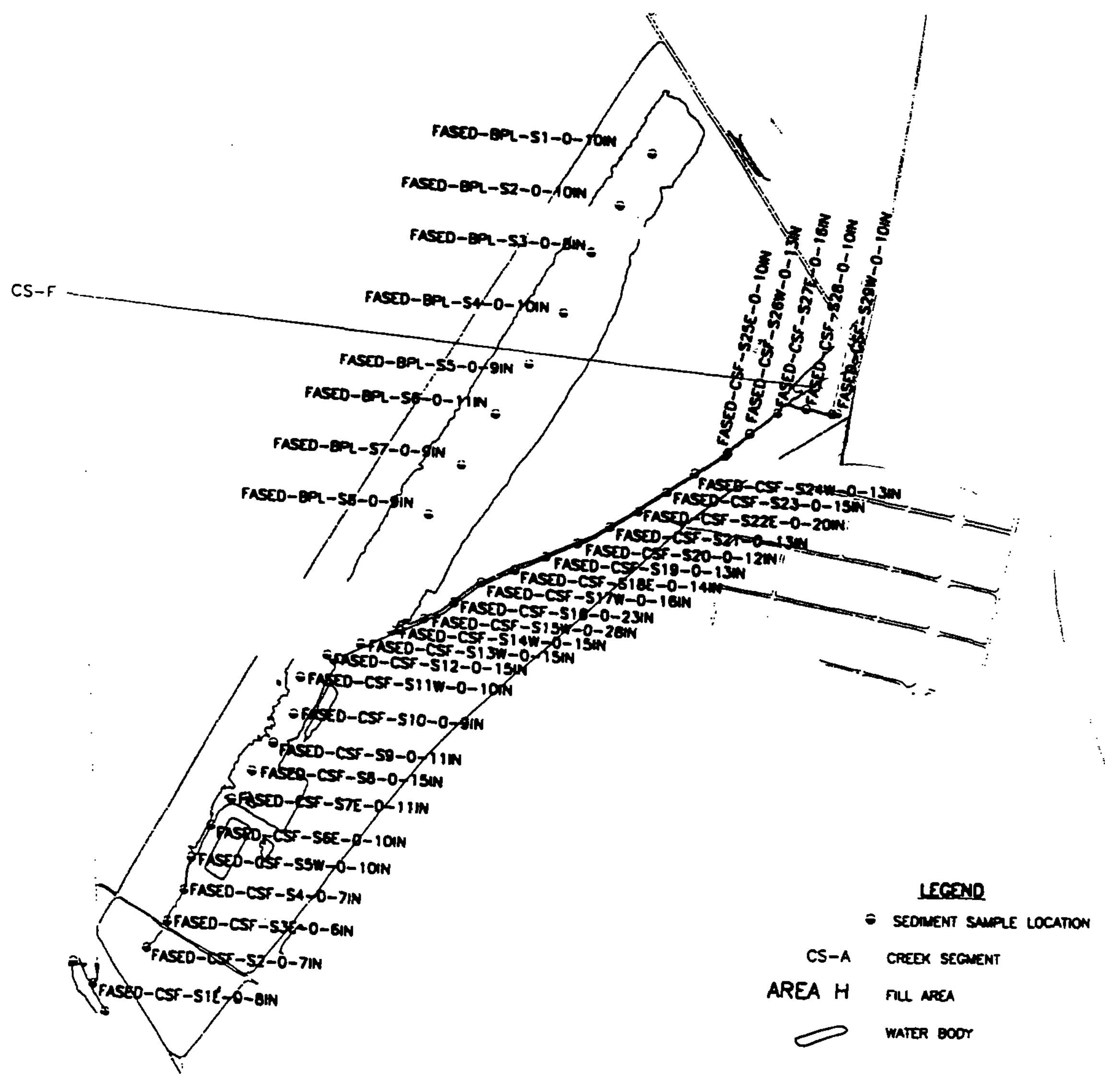
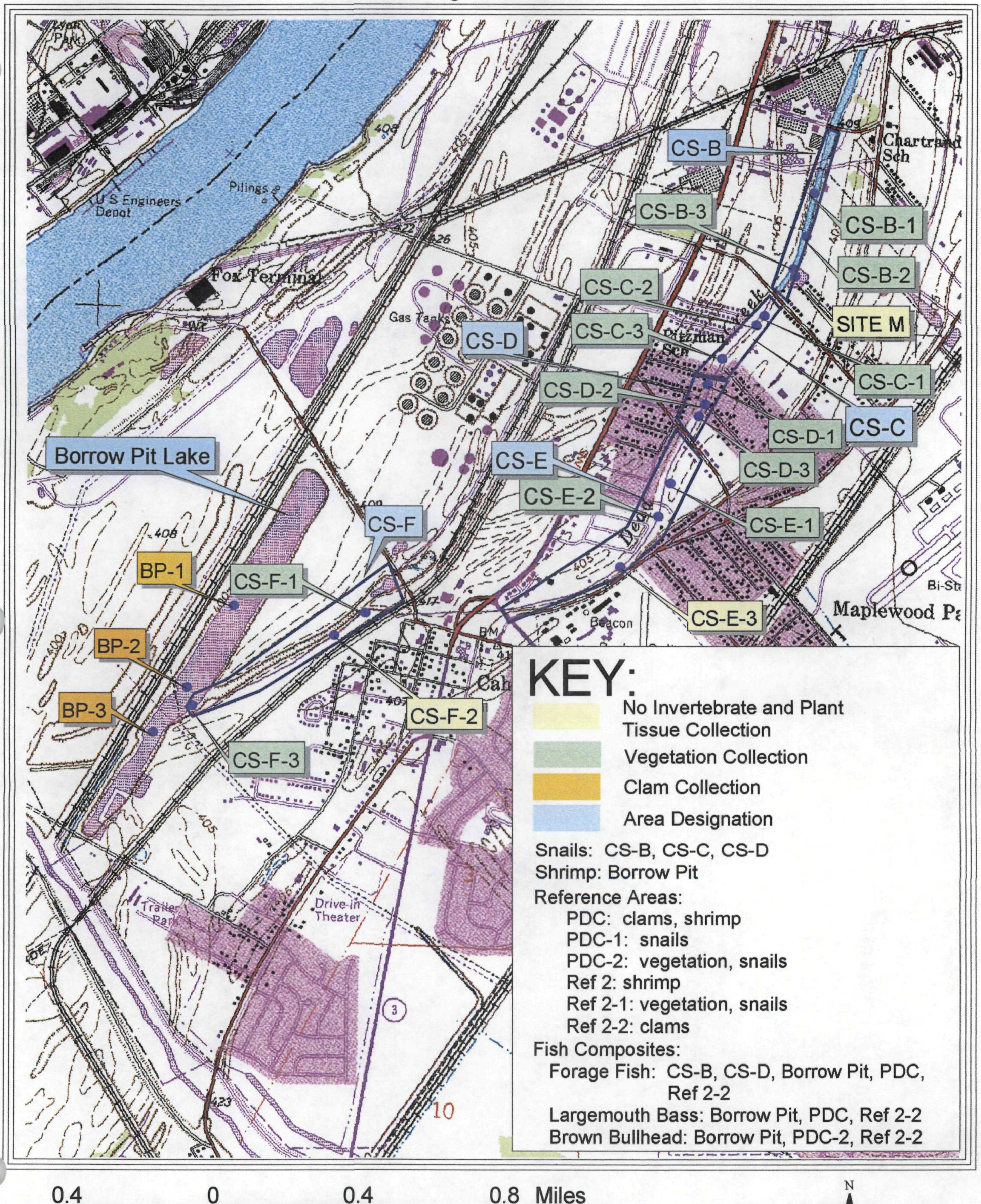


Figure 5-4: Biota Sampling Summary
Sauget Area 1
Sauget, Illinois



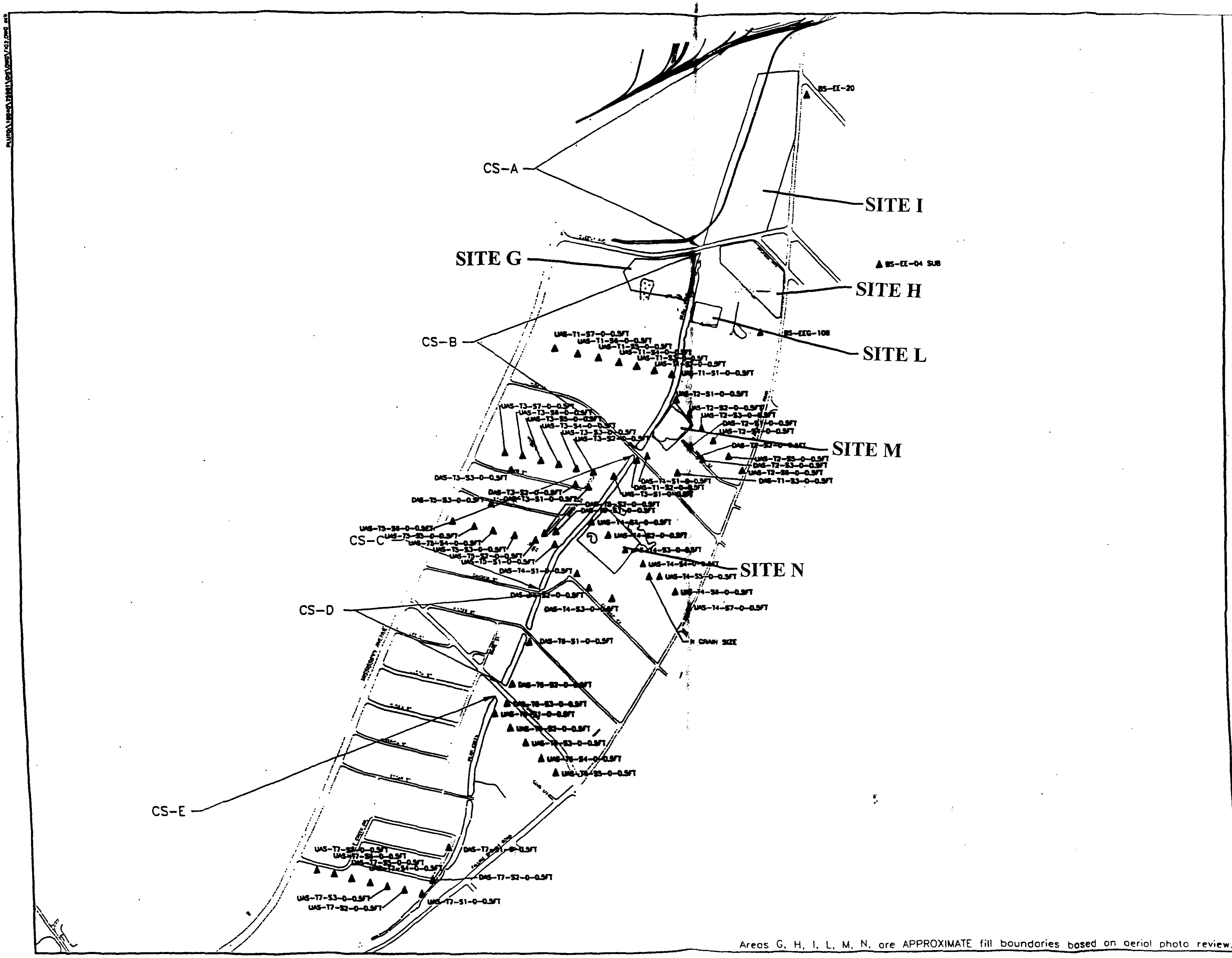


Figure 5-5

LEGEND

▲ SOIL SAMPLING LOCATION

CS-A CREEK SEGMENT

AREA H FILL AREA

WATER BODY

NOTE: SURFACE SOILS WERE COLLECTED AT 0-.5ft. SUBSURFACE SOILS WERE COLLECTED AT 3-6ft. SAMPLE IDENTIFICATIONS ARE DEPICTED FOR SURFACE SOILS SAMPLES.

SOLUTIA INC.
REMEDIATION TECHNOLOGY GROUP
ST. LOUIS, MISSOURI

SAUGET AREA 1
SUPPORT SAMPLING PLAN
SAUGET AND CAHOKIA, ILLINOIS

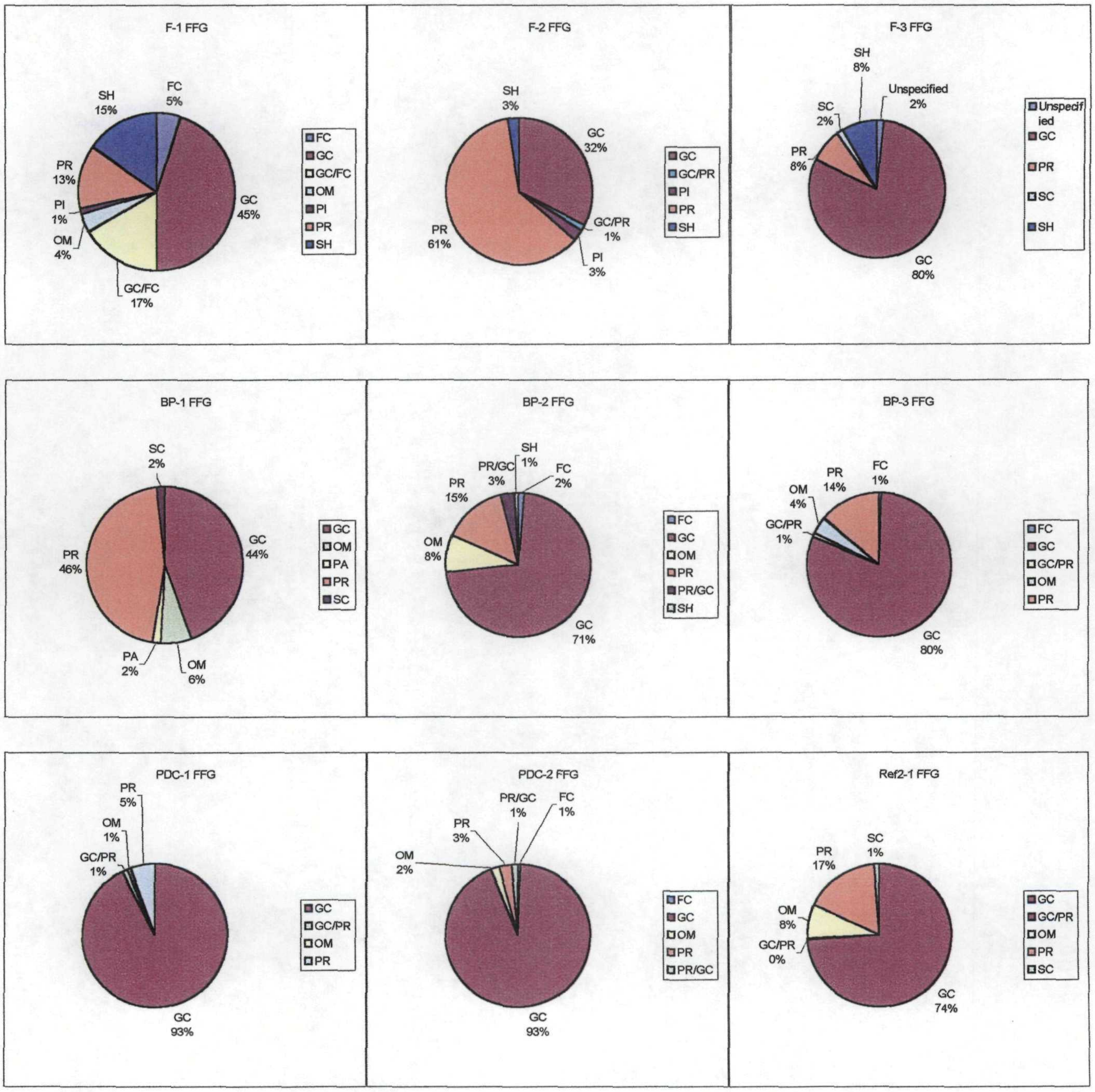
SOIL
SAMPLING LOCATIONS

400 0 400
SCALE IN FEET

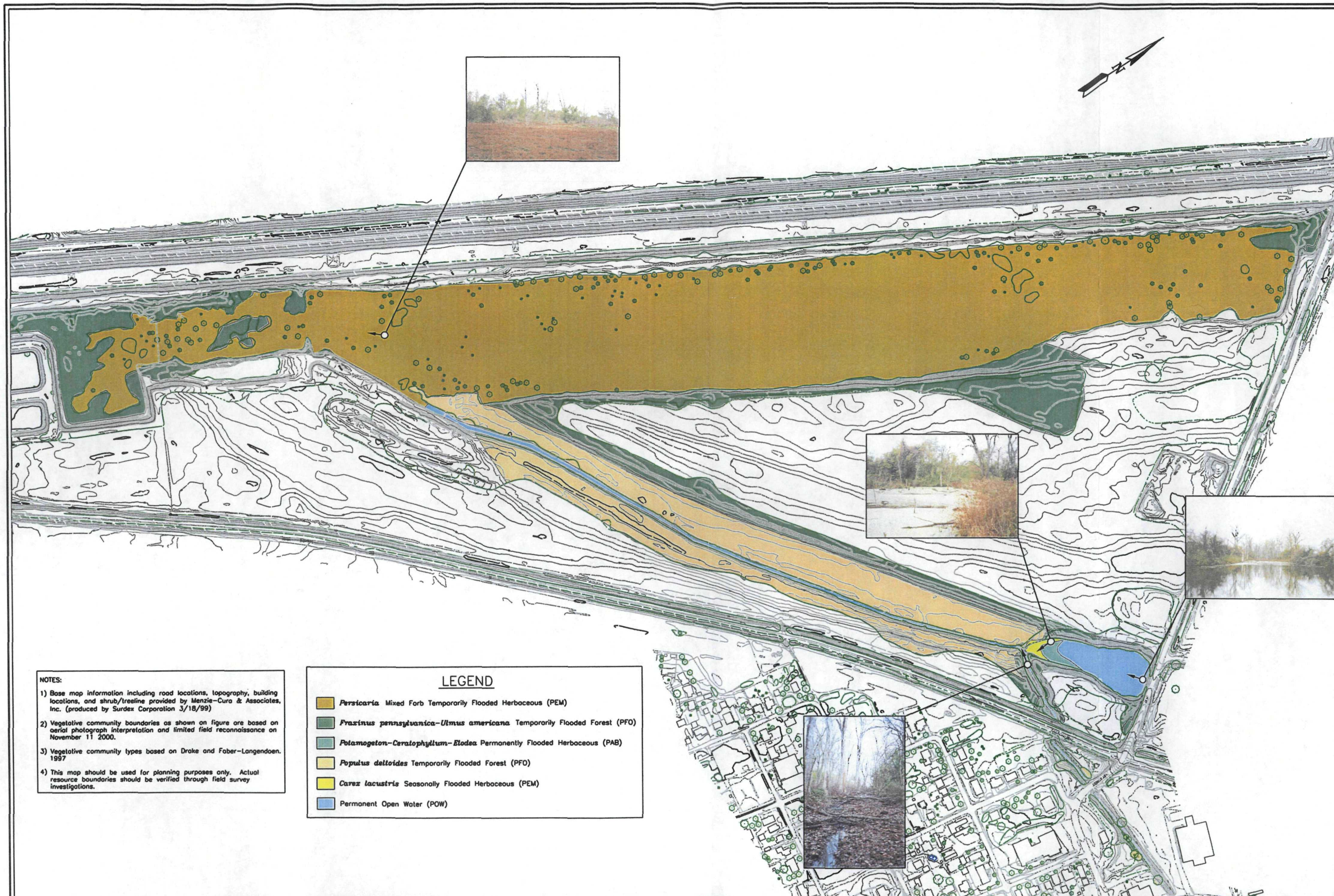
FILE NO. 25501.FIG2
SEPTEMBER 2000

O'BRIEN & GERE ENGINEERS, INC.

Figure 7-1
Summary of Functional Feeding Group (FFG) Abundance
Dead Creek Section F, Borrow Pit Lake, and Reference Areas
Sauget Area I



FC: Filter/collector
GC: Gatherer/collector
OM: Omnivore
PA: Parasite
PI: Piercer
PR: Predator
SC: Scraper
SH: Shredder



NO.	REVISIONS	DATE

PROJECT: Dead Creek Project Area Baseline Habitat Assessment

SHEET TITLE: Area-F and Borrow Pit Lake Vegetative Alliance Map

ADDRESS: Cahokia, Illinois

SCALE: 1"=400'

DATE: March 2001

PREPARED BY: WOODLOT ALTERNATIVES, INC. 122 MAIN STREET, TOPSHAM, MAINE 04086 www.woodlotalt.com

sheet_7-2a.dwg

PROJ. NO. 100123

7-2

APPENDIX A

ECOLOGICAL RISK ASSESSMENT WORK PLAN FOR SAUGET AREA I

ECOLOGICAL RISK ASSESSMENT WORK PLAN
FOR
SAUGET AREA I

SAUGET, ST. CLAIR COUNTY, ILLINOIS

August 11, 1999

Prepared for:

Solutia, Inc.
10300 Olive Boulevard
St. Louis, Missouri 63166-6760

Prepared by:

Menzie-Cura & Associates, Inc.
One Courthouse Lane, Suite Two
Chelmsford, Massachusetts 01824
Phone: (978) 453-4300

TABLE OF CONTENTS:

1.0 INTRODUCTION

1.1 Goals and Objectives

This document is a workplan for a baseline ecological risk assessment at the Sauget Area I in Sauget, Illinois. The plan addresses Dead Creek Segments B, M, C, D, E, and F, and recent USEPA comments regarding the development of a baseline ecological risk assessment for this area (USEPA, 1999). It is also contingent upon a planned field reconnaissance of the subject areas. In particular, this planned reconnaissance will help to finalize sampling locations, receptors, and the location of a reference area. Observations made during the reconnaissance may necessitate alterations in the workplan. We will communicate such proposed alterations in a technical amendment to the plan, should they occur.

The plan follows current United States Environmental Protection Agency (USEPA) guidance in:

> *Ecological Risk Assessment Guidance For Superfund: Process For Designing and Conducting Ecological Risk Assessments* (USEPA, 1997a); and
>
> *Guidelines for Ecological Risk Assessment* (EPA/630/R-95/002F, April, 1998).

The USEPA 1997 guidance document provides an eight-step process. Steps 1 and 2 of this process are a screening level assessment, and Steps 3 through 7 provide guidance for a baseline assessment. The screening level assessment may conclude that site data indicate either:

> a negligible ecological risk and therefore the site requires no further study; or, there is (or might be) a risk of adverse ecological effects, and the ecological risk assessment process will continue.

Previously, the USEPA conducted a Preliminary Ecological Assessment of Dead Creek Segment F, which essentially provides the screening analyses required in Steps 1 and 2 of the guidance (USEPA, 1997b). This USEPA assessment concluded that the site warrants further investigation. Therefore this Work Plan addresses the various elements of Steps 3 through 7 of USEPA guidance for designing a baseline ecological risk assessment to Segment F, as well as Segments B, C, D, E even though they have not been subject to a prior screening level assessment. The workplan includes:

- Description of a Site Conceptual Model;
- Selection of Chemicals of Ecological Concern;
- Identification of Assessment Endpoints;
- Selection of Receptors;
- Selection of Measures of effects and their relation to assessment endpoints;
- Risk Characterization;
- *Discussion of Uncertainties and Assumptions.*

The workplan will explain how the baseline risk assessment will use data described in the Quality Assurance Project Plan/Field-Sampling Plan (QAPP/FSP), that has been prepared and submitted separately. The FSP for the baseline ecological risk assessment describes the details of the field sampling effort as well as the data analysis methods and data quality objectives (DQOs). These include methods for:

conducting a field reconnaissance;

collecting vegetation and benthic organisms in Creek Sectors B to F, M, and the reference areas, and analyzing them for target analytes;

collecting forage fish, predator fish, bottom fish and crayfish in Creek Sector F and the reference areas, and analyzing them for target analytes (we will also collect these organisms in segments B,C,D,E, and, M if observed in those areas);

collecting sediments in Creek Sectors B to F, M, and the reference areas for sediment toxicity testing;

collecting sediments in Creek Sectors B to F, M, and the reference areas for benthic community analysis.

Please refer to the QAPP/FSP for details of field sampling, number of stations, and station locations, and analytical methods.

2.0 SITE CONCEPTUAL MODEL

2.1 Ecological Observations

We will conduct a reconnaissance survey to provide more details and more current information regarding ecological conditions at the various creek sectors. This section provides a description of the site as observed on 29-30 July 1996, when Menzie-Cura & Associates, Inc. personnel (David Peterson, Certified Wildlife Biologist), visited the Sauget Area 1 in Sauget and Cahokia, Illinois and conducted an evaluation of local habitats. The areas observed at that time included ecological resources along: Dead Creek, Prairie du Pont Creek, the associated wetlands, Cahokia Chute, and the Mississippi River. In addition, we contacted federal/state agencies and private conservation organizations concerning additional ecological information available about the area (see Attached List).

Potentially sensitive environments in the Dead Creek area include: Habitat Known to be Used by Federal Designated or Proposed Endangered or Threatened (T/E) Species, Habitat Known to be Used by State Designated Endangered or Threatened Species, and Wetlands.

Habitat Known to be Used by Federal Designated or Proposed Endangered or Threatened Species

According to the records of the Illinois Department of Natural Resources' Natural Heritage Inventory, the only federally endangered or threatened species in the study area is the federally threatened bald eagle (*Haliaeetus leucocephalus*). In 1993, a pair of eagles unsuccessfully attempted to nest at the southern tip of Arsenal Island, where the ditched portion of Prairie du Pont Creek enters the Mississippi River. The pair apparently was scared off the site. The next year the pair returned to the island, but no monitoring was conducted to determine if they successfully nested. During the late July 1996 survey we did not observe any eagles in the study area. Remains of a large stick nest were observed at the southern tip of Arsenal Island, but it did not appear to have been used during 1996. We will also check the State of Missouri files for State Designated Endangered or Threatened Species.

Portions of the area suitable for eagle foraging include waterbodies large enough to support large fish such as carp and catfish. The Mississippi River, the channelized section of Prairie du Pont Creek, and a borrow pond at the lower end of Dead Creek all appear to support large fish and provide enough open water for eagles to fish. No foraging eagles were observed during the site visit, nor have local people in the area seen eagles in the vicinity.

Habitat Known to be Used by State Designated Endangered or Threatened Species

The Illinois Natural Heritage Inventory did not have any records of state-listed endangered or threatened species in the study area. However a number of state-listed wading birds were observed throughout the wetlands and waterways. Illinois endangered species observed were little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*)[1], and black-crowned night heron (*Nycticorax nycticorax*). Great egret (*Casmerodius albus*), an Illinois threatened species, was also observed. Small numbers (one to ten individuals) of these wading birds were found foraging along sections of Dead Creek, the ditched length of Prairie du Pont Creek, Cahokia Chute, and the Mississippi River. The largest concentrations of foraging herons (approximately ten individuals at a location) were observed at the confluence of Dead Creek and the ditched Prairie du Pont Creek, and where the ditched Prairie du Pont flows into the Mississippi. These areas likely support the best concentrated fishing areas for wildlife along the waterways.

No wading bird colonies were located within the study area. However, the Illinois Natural Heritage Inventory has documented two 1000-2000 nest mixed-species colonies in East St. Louis. The closest of these two colonies is approximately one mile east of the Monsanto plant near the Alton & Southern rail yards in Alorton. The second site is over two miles to the north at Audubon Avenue and 26th Street. These two colonies contain the only breeding little blue heron and snowy egret in Illinois. In addition, black-crowned night heron, great egret, cattle egret (*Bubulcus ibis*), great blue heron (*Ardea herodias*), and green-backed heron (*Butorides virescens*) nest in the colonies.

In 1988, because the region is heavily industrialized with numerous Superfund sites, the U.S. Fish & Wildlife Service (USFWS) collected black-crowned night heron and little blue heron eggs from the Alorton colony for contaminant analysis (Young, 1989 - unpublished draft). Sediment samples were also taken in areas of observed wading bird foraging around the East St. Louis region. No testing was done of sediments in the Dead Creek drainage. PCB's, DDE, and metals were detected at varying levels from the wading bird eggs.

The observed endangered and threatened wading birds forage on a wide range of aquatic organisms, such as fish, frogs, and crayfish, as well as some terrestrial species such as reptiles and insects. The USFWS study found that wading birds forage over a wide area around East St. Louis. The Dead Creek/Prairie du Pont wetlands system composes a relatively small percentage of the available wetland foraging area in the region.

Wetlands

Wetlands in the study area consist of riparian woods, shrub swamp, marsh, and wet meadow located adjacent to the area's waterways. Drainage from much of the industrial area at the head of Dead Creek is routed away from the Dead Creek drainage via the local municipal sewer system. Dead Creek begins south of an industrial zone adjacent to the Cerro property and flows slowly south through residential neighborhoods. The stream is bordered by a dense, narrow band of riparian trees and shrubs, including cottonwood, willow, mulberry, and box elder (Photo B-1). Homeowners have cleared to the creek's edge and have established lawn along several sections. Within the residential area (east of Route 3) the stream is crossed, via

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[1] Also endangered in Missouri.

culverts, by seven roads. At the Judith Lane road crossing, the road culvert has been set approximately one foot higher than the observed water level, apparently to allow drainage of the channel only during high-water events. The pooled channel behind this road is connected to a small pond located at the end of Walnut Street where herons, painted turtle, wood duck, fish, and evidence of beaver (chewed trees, see Photo B-2) were observed (see Table B-1).

Downstream of the impounded channel, Dead Creek segments C and D flow south through bordering wetlands (Photo B-3, note Green Backed Heron in center of photograph). For a short section, adjacent to Parks College, the creek is routed through a culvert under a parking area. Throughout the rest of the creek's length it is bordered by either riparian vegetation (Photo B-4) or lawn (Photo B-5). Emergent and aquatic vegetation occurs along the creek's shores. Wildlife observed in and adjacent to the stream included herons, turtles, songbirds, squirrel, and raccoon. Small fish and frogs were observed throughout the creek's length.

West of Route 3, the creek flows south and west through the American Bottoms floodplain. This area contains active and abandoned agricultural land divided by levees and railroad right-of-ways. After crossing Route 3 Dead Creek flows under a railroad right-of-way and is joined by a stream draining land from the north. North of the confluence of these two waterways is a road that cuts SE to NW across the floodplain, connecting Cahokia to Fox Terminal. To the north (upstream) of this road is a gas tank farm and fields. The stream was observed to flow south under the Fox Terminal road and into Dead Creek. A second dry culvert was observed west of the stream crossing in the vicinity of the north end of the Dead Creek borrow pond. This culvert appeared to drain the land north of the Fox Terminal road during high-water events when water from the tank farm and surrounding area becomes impounded behind the roadway.

Downstream of the confluence of the two waterways, Dead Creek flows through riparian woods and shrubs and into a borrow pond. The pond appears to have been excavated during the construction of the local levee system. The United States Geological Survey (USGS) map of the area (Cahokia) indicates that the pond was dug to its current shape sometime after 1954. The pond is the largest non-flowing water body in the area. Its shore is surrounded with mature riparian trees and emergent wetland vegetation. Ducks, herons, and fish were observed in the pond.

Dead Creek forms the outlet of the pond, draining south through a pump station under the levee (Photo B-6) and into the ditched section of Prairie du Pont Creek. At the confluence and above it (Photo B-7) the ditch shore is vegetated with grasses, herbs, and small shrubs. The channel flows northwest to Arsenal Island on the Mississippi River. Arsenal Island contains areas of mature riparian woods and agricultural fields. The shoreline of the lower end of the ditch (referred to on the USGS map as Cahokia Chute) is lined with riparian woods, principally large cottonwoods and willow (Photo B-8). Large catfish, wood duck, wading birds, and turtles were observed in the channel. Cahokia Chute forms the eastern border of Arsenal Island. The waterway flows north to south, draining the region northeast of the island. It appears that during times when the Mississippi River is high, the River uses the Chute channel to flow around Arsenal Island. Any water from the Dead Creek watershed therefore only flows through the lower half of the Cahokia Chute between the confluence with the ditched Prairie du Pont and the Mississippi River. The remains of the bald eagle nest and congregating wading birds were observed at the southern tip of Arsenal Island, where the Chute flows into the Mississippi.

Almost the entire length of the Dead Creek study area is bordered by wetlands. Most of the wetlands are confined to a narrow riparian strip adjacent to the Creek. More extensive wetlands occur west of Route 3, particularly in the vicinity of the borrow pond. The Creek's wetlands appeared healthy with no evidence of ecological stress (no chlorotic plants, no nonspecific stands of vegetation, no areas of dying or dead vegetation, observable presence of diverse pelagic communities in the stream, no observed surface water sheens or sediment staining). The wetlands also appeared to support a diverse aquatic and terrestrial wildlife community, with abundant prey species (i.e. fish, frogs, turtles) and predatory species (i.e. wading birds, waterfowl, raccoons) present. The wetlands west of Route 3 receive water from both Dead Creek and from drainages to the north, including the area around the gas tank farm.

Summary

During the field survey and subsequent contact with state and federal agencies, three categories of sensitive environments were located in the Monsanto/Dead Creek area: Habitat Known to be Used by Federal Designated or Proposed Endangered or Threatened Species, Habitat Known to be Used by State Designated Endangered or Threatened Species, and Wetlands. These three categories are interrelated with the rare species documented all utilizing wetland/waterway habitats. The rare species observed forage over a wide area, with the Dead Creek watershed forming only a small part of their available feeding territory.

The Dead Creek watershed also appears to support a diverse plant and animal community. While much of the Creek flows through residential neighborhoods, sufficient natural riparian vegetation remains to support local aquatic and terrestrial communities. No evidence of ecological stress was evident in the upper Creek, nor anywhere else along the waterway's path to the Mississippi.

2.2 Site Conceptual Model

The foundation of an ERA work plan is the site conceptual model. It integrates information from the preliminary observations at the site (usually incorporated into the screening level risk assessment). According to EPA guidance, the conceptual model addresses:

environmental setting and contaminants known or suspected to exist at the site;

contaminant fate and transport mechanisms;

mechanisms of ecotoxicity and likely categories of potentially affected receptors;

complete exposure pathways.

Figure 1C-1 provides a Preliminary Conceptual Model diagram. It illustrates potential contaminant transport from the contaminated media through the potentially affected habitats to important ecological receptors. We will revisit and, if necessary, amend this model after completion of the site reconnaissance survey.

The site conceptual model is consistent with our knowledge of the area to date as described in our 1996 survey and in the recent EPA Preliminary Risk Assessment.

Environmental Setting and Contaminants Known Or Suspected To Exist At The Site

Subsection 2.1 describes the environmental setting. The EPA Preliminary Ecological Risk Assessment describes the contaminants known or suspected to be at the site. The environmental setting is an aquatic environment with extensive wetlands, riparian woods, narrow, shallow streams, broader semi-impounded basins, and floodplain.

The likely contaminants include those addressed in the EPA assessment:

metals (arsenic, barium, cadmium, chromium, lead, mercury);

PCBs;

PAHs;

dioxin.

The eventual execution of the QAPP/FSP will analyze for a broader list of potential contaminants in sediments, surface water, and biota. We will evaluate those data within the baseline risk assessment and add contaminants as appropriate based on: frequency of occurrence within a particular media, likely bioavailabilty, evidence for bioaccumulation, toxicity to likely receptors, and comparison of concentrations to a reference area. Obviously, the addition of more contaminants of concern may require changes in the conceptual model for the baseline risk assessment depending upon the fate, transport, and biological properties of these contaminants. The EPA guidance recognizes and encourages this iterative process.

Contaminant Fate and Transport Mechanisms

In an aquatic system such as occurs over Dead Creek Sectors B through F, and M, various physical, chemical, and biological transport mechanisms will affect the fate of contaminants. All the contaminants listed in the EPA Preliminary Assessment adhere to particulate matter to varying degrees. Therefore, the conceptual model should address those mechanism affecting particle distribution in aquatic systems. These include:

particulate runoff from the watershed,

deposition in areas of sluggishly flowing waters,

erosion in faster moving stream segments, and

resuspension of particulates from the stream bed and over the floodplain.

Chemicals with lower particle affinities may be more subject to dissolution in and transport by surface water. Increasing solubility generally correlates with increasing bioavailability. In particular, various metals on the preliminary list of contaminants are subject to transport in soluble form, depending on their valence states.

The major biological mechanisms affecting fate and transport are:

biological uptake directly from environmental media; and,

bioaccumulation through ingestion of prey or media;

biomagnification through the food chain.

Several of the contaminants are subject to one or all of these biological fate and transport mechanisms.

The baseline risk assessment will describe each contaminant of concern (including any added after the next sampling rounds) in terms of the transport mechanisms most likely to affect it. The EPA Preliminary Risk Assessment provides a description of the likely transport mechanisms for each of the contaminants or classes of contaminants listed.

Mechanisms of Ecotoxicity And Likely Categories Of Potentially Affected Receptors

The EPA Preliminary Risk Assessment summarizes the ecotoxicological properties of the potential contaminants in sufficient detail to develop the first iteration of the conceptual model. As indicated in the summaries, the various contaminants may affect the survival and reproductive capacity of benthic biota, fish, invertebrates, vascular plants, and algae.

The baseline risk assessment will provide detailed ecotoxicity profiles for the final list of contaminants of concern. These will include summaries of the toxicity of these chemicals to receptors likely to occur in the Dead Creek environment (insofar as these exist), and a selection of the most appropriate toxicity factor to use in the baseline risk assessment.

The categories of likely potentially affected receptors for an aquatic system such as the Dead Creek, Sectors B through F, and M include:

The benthic macroinvertebrate community;

warm water fish (e.g., largemouth bass);

waterfowl (e.g. mallard) that feed on plants and macroinvertebrates (including crayfish);

piscivorous birds (e.g., great blue heron, bald eagle);

aquatic mammals (e.g. muskrat) that feed on plants and macroinvertebrates (including crayfish);

aquatic mammals (e.g., river otter or racoon) that feed on fish and macroinvertebrates (including crayfish).

There is also some potential for exposure to terrestrial plants and wildlife from exposure to contaminants in soil or through exposure to soil based food chains.

Complete Exposure Pathways

The USEPA guidance indicates that the risk assessment must identify complete exposure pathways before a quantitative evaluation of toxicity to allow the assessment to focus on those contaminants that can reach ecological receptors. The likely complete exposure pathways in Dead Creek, Sectors B through F, and M are:

sediment to benthic invertebrates via direct contact and ingestion;

sediment and surface water to aquatic plants via uptake;

surface water to invertebrates and fish though direct contact and ingestion;

benthic biota (including crayfish) to higher order predators (e.g. fish) through food chain;

forage fish and crayfish to piscivorous fish, mammals, or birds;

soil to soil invertebrates along the creek banks or floodplain;

soil to plants or wildlife along the creek banks or floodplain.

3.0 SELECTION OF CHEMICALS OF ECOLOGICAL CONCERN (COECs)

As indicated in subsection 2.2, the USEPA Preliminary Risk Assessment provides an initial list of contaminants of ecological concern (COECs). The QAPP/FSP includes target analytes beyond these initial COECs. These target analytes include: VOCs, metals, SVOCs, PCBs, and pesticides.

The baseline risk assessment will re-evaluate the COEC list based in the results of the proposed sampling and analysis of surface water, sediment, and biota. The criteria for final selection include:

> Comparison to Background – the baseline risk assessment will eliminate a contaminants which occurs below the maximum concentration measured at a local reference area for a given medium;
>
> Frequency of Detection – the baseline risk assessment will retain a contaminant detected in more than 5% of samples for a particular media.

For those compounds which exceed background and/or are frequently detected in a particular medium, the baseline risk assessment will add them to the final list of COECs if they exhibit any of the following characteristics:

> Toxic – exhibit toxicity (based on scientific literature) to the receptors likely to occur along the Dead Creek, Sectors B through F and M, or adjacent habitats;
>
> Bioaccumulative – are likely to bioconcentrate or biomagnify through the food chains represented in Dead Creek, Sectors B through F, and M, and adjacent habitats;
>
> Persistent – are likely to remain in environmental media over time frames that are long relative to the life spans or exposure periods of receptors likely to occur in Dead Creek, Sectors B through F, and M, and adjacent habitats.

The ERA will include a current review of toxicological information for all COECs on the final list. Where available, this information will include toxicity benchmarks that are applicable to water and sediments.

4.0 IDENTIFICATION OF RECEPTORS, ASSESSMENT ENDPOINTS, AND MEASURES OF EFFECT

4.1 Receptors

This subsection of the ecological risk assessment identifies the receptors (receptor species) and provides the rationale for their selection as representative of the species that occur or are likely to occur near the site. This subsection also provides an ecological characterization of each receptor for eventual use in developing the exposure assessment.

The selected receptors represent those types of organisms most likely to encounter the contaminants of concern at the site. They include a reasonable (although not comprehensive) cross-section of the major functional and structural components of the ecosystem under study based on:

relative abundance and ecological importance within the selected habitats;

availability and quality of applicable toxicological literature;

relative sensitivity to the contaminants of concern;

trophic status;

relative mobility and local feeding ranges;

ability to bioaccumulate contaminants of concern.

The selected species represent different feeding guilds. This representative species approach for assessing exposures for wildlife is a common practice for assessing risk. A guild is a group of animals within a habitat that use resources in the same way. Coexisting members of guilds are similar in terms of their habitat requirements, dietary habits, and functional relationships with other species in the habitat. Guilds may be organized into potential receptor groups. The use of the guild approach allows focused integration of many variables related to potential exposure. These variables include characteristics of COECs (toxicity, bioaccumulation, and mode of action), and characteristics of potential receptors (habitat, range and feeding requirements, and relationships between species). This approach evaluates potential exposures to all animals by considering the major feeding guilds found in a habitat. It is assumed that evaluation of the potential effects of COECs to the representative species will be indicative of the potential effects of COECs to individual member classes of organisms within each feeding guild.

The selected species represent the ecological community and its sensitivity to the contaminants of concern. They are: benthic invertebrates, shellfish, local fin fish, great blue heron, mallard, bald eagle, muskrat, and river otter or raccoon.

Benthic invertebrates

Benthic invertebrates are potential receptor species in Dead Creek because they:

have the greatest exposure to sediments;

provide food for bottom-feeding fish species (in the river);

are relatively immobile (sessile) in habit, and therefore their general health and condition reflects local conditions;

Warm Water Fish Species

Warm water resident fish species were selected to reflect local sediment and water quality conditions. The typical warm water fish species such as centrachids (sunfish, bass) and bottom feeding fish such as bullheads are likely and abundant local resident with a limited foraging range. These organisms are potential receptor species representing local fish because they are:

resident in this reach of the Dead Creek;

exposed to sediments as well as surface water;

represent forage fish and higher order predators feeding on smaller fish and invertebrates.

Aquatic Birds

We have selected great blue heron, mallard duck, and bald eagle to represent aquatic birds feeding in Dead Creek, Sectors B through F, and M for at least a portion of the time.

Great Blue Heron (*Ardea herodias*)

The great blue heron inhabits salt and freshwater environments, typically shallow waters and shores of lakes, flooded gravel pits, marshes and oceans. In marsh environments, the great blue heron is an opportunistic feeder; they prefer fish, but they will also eat amphibians, reptiles, crustaceans, insects, birds, and mammals. The diet varies but may include up to 100% fish. A Nova Scotia study found 6% forage fish (Atlantic silverside and mummichog), 52.6% eels, and 41.4% other fish in the diet of great blue heron (USEPA, 1993). A food ingestion rate for adult breeding birds of 0.18 g food/g body weight/day has been reported.

Great blue heron tend to forage near nesting sites (USEPA, 1993). A study in Minnesota measured the distance between nesting and foraging grounds to range from 0 to 2.7 miles. A Carolina study found the same distance to be 4 to 5 miles. The maximum distance great blue heron will fly between foraging areas is 9 to 13 miles (USEPA, 1993). The size of the feeding territory in a freshwater area in Oregon was 1.5 acres, while the feeding territory in an estuarine area was 21 acres.

These organisms are potential receptor species because they:

Consume near shore fish;

Have a foraging range about equal to the downstream area of the Dead Creek sectors;

Are a higher trophic level predator in the creek and Mississippi.

Great blue heron, therefore, represent piscivorous birds in this reach of the river.

Mallard (*Anas platyrhynchos*)

The mallard is the most common freshwater duck of the United States, found on lakes, rivers, ponds, etc. It is a dabbling duck, and feeds (usually in shallow water) by "tipping up" and eating food off the bottom of the water body. Primarily, it consumes aquatic plants and seeds (for instance, primrose willow and bulrush seeds), but it will also eat aquatic insects, other aquatic invertebrates, snails and other molluscs, tadpoles, fishes, and fish eggs. Ducklings and breeding females consume mostly aquatic invertebrates. The mallard's home range is variable, but an approximate range is 500 hectares. It prefers to nest on ground sheltered by dense grass-like vegetation, near the water.

Mallards are a potential receptor species because they:

Consume both aquatic plants and aquatic invertebrates;

Live on or near the water;

Are a lower trophic level duck in the creek and in Mississippi.

Mallards, therefore, represent waterfowl in this reach of the river.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles are generally found in coastal areas, near lakes or rivers. Their preferred breeding sites are in large trees near open water. They are usually found in areas with minimal human activity.

Bald eagles, although primarily carrion feeders, are opportunistic and will eat whatever is plentiful including fish, birds, and mammals. Reported food ingestion rates range from 0.064 to 0.14 g/g/day. A study of adult breeding bald eagles in Connecticut estimated a food ingestion rate of 0.12 g/g/day (USEPA, 1993). A study of bald eagle diets in Maine indicated that their diets consisted of 76.7% fish, 16.5% birds, and 6.8% mammals (USEPA, 1993).

Foraging areas vary according to season and location. The USEPA (1993) reports a foraging length of 2 to 4.5 miles along a river.

These organisms are potential receptor species because they:

Consume fish;

Are a higher trophic level predator in the river;

Are sensitive to contaminants that biomagnify in the food chain.

The bald eagle, therefore, represents predatory birds in these sectors of Dead Creek.

Aquatic Mammals

This assessment assumes that either river otter (or racoon if the site reconnaissance indicates that otter are unlikely to occur in the area) and muskrat represent aquatic mammals in Dead Creek sectors B through F.

River Otter (*Lutra canadensis*)

The river otter can be found in primarily freshwater but also saltwater environments, but seems to prefer flowing-water habitats rather than still water. It has been found in lakes, marshes, streams, and seashores. It consumes largely fish, but is opportunistic and will consume aquatic invertebrates (crabs, crayfish, etc.), aquatic insects, amphibians, birds (e.g. ducks), small or young mammals, and turtles. They may also sift through sediment for food. The otter dens in banks, in hollow logs, or similar burrow-like places. Home range varies depending on habitat and sex, but an approximate measure is 300 hectares.

River otters are a potential receptor species because they:

Consume fish and aquatic invertebrates;

Live in or near the water;

Are a higher trophic level predator in the creek and in Mississippi.

River otters, therefore, represent higher trophic level aquatic mammals in this reach of the river.

Raccoon (*Procyon lotor*)

The raccoon is likely to be present because the creek and surrounding areas consist of its most preferred types of habitat (marshes and suburban residential areas). Because the raccoon is an omnivore, it is likely to experience greater exposure to than the muskrat which is primarily a herbivore. The raccoon is known to consume aquatic invertebrates (such as crayfish), fish, insects, mollusks, annelids, bird eggs, small passerine birds, small mammals such as squirrels, and plants (Chapman and Feldhamer, 1990).

Raccoon are a potential receptor species because they:

Consume fish and aquatic invertebrates;

Live near the water;

Are a higher trophic level predator in the creek and in Mississippi.

Raccoon, therefore, represent higher trophic level aquatic mammals in this reach of the river.

Muskrat (*Ondatra zibethicus*)

The muskrat is a semiaquatic large rodent which lives near freshwater and brackish aquatic environments: marshes, ponds, creeks, lakes, etc. It feeds largely on aquatic plants, but depending on location and time of year may also consume aquatic invertebrates (crayfish, crabs, etc.), small amphibians, turtles, fish, molluscs, and even young birds. The muskrat lives quite close to the water, either on the bank of the water body or constructing a lodge in the water body. Its home range is small (0.17 hectares on average) and one study found that muskrats remain within 15 meters of their primary dwellings 50 percent of the time.

Muskrats are a potential receptor species because they:

Consume aquatic plants and aquatic invertebrates;

Live on or near the water;

Are a lower trophic level omnivore in the creek and in Mississippi.

Muskrats, therefore, represent lower trophic level aquatic mammals in this reach of the river.

Soil invertebrates

Soil invertebrates are potential receptor species in Dead Creek banks and floodplain because they:

have the greatest exposure to soil;

provide food for birds and mammals (in the river);

are relatively immobile (sessile) in habit, and therefore their general health and condition reflects local conditions;

4.2 Assessment Endpoints

Assessment endpoints are expressions of the environmental value to be protected at a site. Assessment endpoints are often not directly measurable. Therefore, assessment employs measures of effects. These are biological or measurable ecological characteristics which reflect the assessment endpoint (USEPA, 1997). Where the assessment endpoint is not directly measurable, the use of a measure of effect may result in some uncertainty in the risk characterization. Ultimately, the selection of assessment endpoints requires the consensus of the regulators, the regulated community, and state or local concerns. This work plan proposes the following assessment endpoints for the potentially-affected aquatic receptors and their habitats:

Sustainability (survival, growth, and reproduction) of warm water fish species typical of those found in similar habitats (incorporates the assessment of benthic macroinvertebrates and crayfish);

Survival, growth, and reproduction of local populations of aquatic wildlife represented by bald eagles, mallard duck, great blue heron, muskrat, and river otter or raccoon (incorporates the assessment of benthic macroinvertebrates and crayfish).

The assessment will evaluate risk relative to these assessment endpoints in Creek, Sectors B through F and M, collectively and individually, based on prior observations and the work proposed in the QAPP/FSP.

4.3 Selection of Measures of Effects

The measures of effect direct data collection needs for the baseline ecological risk assessment. They provide the actual measurements for estimating risk. A weight-of-evidence approach (Menzie et al., 1996) weighs each of the measures of effects by considering:

strength of association between the measure of effects and assessment endpoint;

data quality; and

study design and execution.

Strength of association refers to how well a measure of effects represents an assessment endpoint. The greater the strength of association between the measurement and assessment endpoint, the greater the weight given to that measure of effect in the risk analysis.

The weight given a measure of effect also depends on the quality of the data as well as the overall study design and execution. The QAPP/FSP describes a sampling program that will provide information adequate for evaluating each selected measure. However, the risk assessment must evaluate the performance of the sampling effort and the variability and uncertainties associated with the results following implementation. The risk characterization gives higher weight to measures of effect that are based on good quality data and are obtained using study designs that account for confounding variables.

There is considerable uncertainty associated with estimating risks, because ecological systems are complex and exhibit high natural variability. Measures of effects typically have specific strengths and weaknesses related to the factors discussed above. Therefore, it is common practice to use more than one measure of effect to evaluate each assessment endpoint. This subsection describes the measures of effects and how the baseline risk assessment will use them to evaluate risks for each of the assessment endpoints.

TABLE 1
ASSESSMENT ENDPOINTS
AND ASSOCIATED MEASURES OF EFFECTS

Assessment Endpoint 1: Sustainability of warm water fish in Creek Sector F

Measure of effect 1a: body burdens of COECs in selected fish species as a measure of exposure (compared to body burdens in fish from reference areas) and effects (compared to benchmark values).

Measure of effect 1b: COEC concentrations in surface waters as compared to applicable water quality criteria for protection of fish and wildlife.

Measure of effect 1c: sustainability of a benthic macroinvertebrate community that can serve as a prey base for fish:

Concentration of COECs in sediment;

Field assessment of benthic macroinvertebrate community structure (using EPA Rapid Bioassessment Protocol I, as described in *Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish*, EPA/444/4-89-001.

Sediment toxicity tests.

Assessment Endpoint 2: Survival, growth, and reproduction of local populations of aquatic wildlife as represented by the bald eagle, mallard duck, great blue heron, muskrat, and river otter or raccoon in Creek Sectors B through F, and M

Measure of effect 2a: Wildlife species composition and habitat use.

Measure of effect 2b: Concentration of semi-volatile compounds (SVOCs), metals, mercury, Polychlorinated Biphenyls (PCBs), pesticides, cyanide, herbicides, and dioxin in aquatic and marsh plants for use in evaluating exposure via the food chains for mallard duck, river otter or raccoon , and muskrat.

Measure of effect 2c: Concentration of COECs in surface waters in comparison to wildlife benchmarks.

Measure of effect 2d: Concentration of COECs in forage fish and crayfish for use in evaluating exposure via the food chain for great blue heron and river otter or raccoon.

Measure of effect 2e: Concentration of SVOCs, metals, mercury, PCBs, pesticides, cyanide, herbicides, and dioxin in macroinvertebrates (including crayfish) for use in evaluating exposure via the food chain for mallard duck, river otter or raccoon and muskrat.

Measure of effect 2f: sustainability of a benthic macroinvertebrate community that can serve as a prey base for fish (includes three lines of evidence as in Assessment Endpoint 1).

Assessment Endpoint 3: Survival, growth, and reproduction of individuals within the local bald eagle population in Creek Sectors B through F, and M

Measure of effect 3a: Concentration of COECs in fish for use in evaluating exposure via the food chain.

Assessment Endpoint 4: Survival, growth, and reproduction of local populations of terrestrial wildlife along the banks and floodplain of Creek Sectors B through F, and M

Measure of effect 4a: Soil screening effect levels for the protection of wildlife, plants, and soil dwelling invertebrates.

4.3.1 Measures of Effects for Assessment Endpoint 1, Sustainability of Warm Water Fish

The COECs may exert direct effects on warm water fish through exposure in the water, sediment, or prey, and indirectly by affecting their prey, the macroinvertebrate community. The proposed measures of effects assess exposure pathways and potential effects. Some rely upon direct observations of conditions; some involve measures of toxicity; and others use literature values.

Measure of effect 1a: body burdens of COECs in selected fish species.

Purpose and Rationale. Fish exposed to bioaccumulative compounds in their diet or in water can accumulate these COECs in their tissues. Contaminants tend to accumulate in organs such as the liver and kidney to a greater degree than in the musculature. However, COEC levels in the muscle tissue and on a whole body basis are useful for evaluating risks to animals that eat fish. The assessment will use measurements of COECs in fish tissues to evaluate exposure and effects on the fish, and to provide data for use in other parts of the assessment.

Approach. The assessment will use this endpoint to evaluate exposure and effects. As a measure of exposure, it will compare body burdens of COECs in small forage fish, medium bottom-feeding fish and large piscivorous fish to those same fish species in the reference area. Therefore, the comparisons of fish body will help to assess if fish in Dead Creek are exposed to COECs in excess of those that occur in the reference area. The assessment will also use the body burden data as input to the food chain exposure models for the representative piscivores (the great blue heron, bald eagle, and the river otter or raccoon).

As a measure of effects, the assessment will compare measured body burdens to literature values at which effects have been reported. The Waterways Experiment Station (WES) of the Army Corps of Engineers provides an on-line database and The Society of Environmental Toxicology and Chemistry (Jarvinen and Ankley, 1999) provides a compilation of such residue effect levels. The assessment will query these databases. If body burdens exceed levels at which effects have been reported in the databases, it will be presumed that the measure of effect indicates the potential for effects in the selected fish species found in Dead

Creek.

Measure of effect 1b: COEC concentrations in surface waters as compared to applicable water quality criteria for protection of fish and wildlife.

Purpose and Rationale. Water concentrations provide a measure of exposure, and water quality criteria indicate levels above which effects may occur. This measure of effect will evaluate the potential for water concentrations of COECs in Dead Creek to cause adverse effects.

Approach: The assessment will compare measured concentrations of dissolved metals in surface waters to water quality criteria. Exposure of individual fish and the populations of fish in water will partly depend on the exposure field and the distribution and behavior of the fish. Thus, the area over which water quality criteria are exceeded becomes an important consideration when evaluating exposure. We will evaluate effects with respect to spatial extent and degree to which surface water concentrations exceed water quality criteria.

The USEPA has published an ECO-UPDATE entitled: "Ecotox Thresholds" that includes COEC-specific water quality benchmarks. If an Ecotox Threshold value is available for a COEC, the concentration of the COEC in water will be compared to its respective Ecotox Threshold value. When specific benchmarks are not available and when appropriate, USEPA has suggested using appropriate extrapolations between related species.

Measure of effect 1c: Sustainability of benthic macroinvertebrate communities that comprise a prey base

Purpose and Rationale. Benthic macroinvertebrates are an important source of food for many fish species. They experience direct sediment exposures due to their life histories. Exposures that result in reduced abundance, diversity, or biomass of these aquatic macroinvertebrates, could indirectly effect fish populations. Further, quantitative studies of benthic macroinvertebrates have a long history of use in water quality studies.

The assessment will use the sediment triad approach as part of a weight-of-evidence analysis to evaluate the sustainability of benthic macroinvertebrate communities in these water bodies. The sediment triad approach evaluates three elements of a benthic community:

field assessment of benthic macroinvertebrates;

sediment chemistry measurements;

sediment toxicity testing using indicator benthic macroinvertebrates.

Field assessment of benthic macroinvertebrate community

Effects will be evaluated by comparing the composition and abundance of benthic macroinvertebrates within Dead Creek at different levels of concentrations of COECs in sediments (generally following EPA Rapid Bioassessment Level I Protocols in the field). These comparisons will help to estimate if there is a level above which effects are evident. Data from the reference areas will help to support the assessment because these reflect conditions in water bodies unaffected by site contaminants. If there are observable reductions in the abundance of benthic macroinvertebrates, we will assess the significance of this for the fish species that rely upon the macroinvertebrates for food as this is the basis for the assessment. This will be accomplished by relating the abundance and biomass of benthic macroinvertebrates to their production, and ultimately to the potential production of fish, using available production:biomass ratios from the literature.

Sediment chemical measurements

Concentrations of COECs in sediment will be compared to sediment benchmarks to judge whether adverse biological effects to benthic macroinvertebrates are plausible. The USEPA compares sediment chemical measurements to Effect Range-Low (ERL) values and Effect Range-Median (ERM) values (Long and Morgan, 1990). However, sediment concentrations which exceed ER-Ls and/or ER-Ms do not necessary indicate that adverse effects to benthic macroinvertebrates have occurred. The USEPA's sediment triad approach uses multiple lines of evidence to assess if benthic macroinvertebrates are adversely affected by sediment-associated contaminants.

The USEPA has published an ECO-UPDATE entitled: "Ecotox Thresholds" that includes COEC-specific sediment benchmarks. If an Ecotox Threshold value is available for a COEC, the concentration of the COEC in sediment will be compared its respective Ecotox Threshold value. When specific benchmarks are not available and when appropriate, USEPA has suggested that appropriate extrapolations between related species can be used.

Sediment toxicity testing

The assessment will use laboratory sediment bioassays conducted on sediments from Dead Creek and the reference area to evaluate the potential effects of whole sediment on representative benthic macroinvertebrates. The toxicity of the sediment will be compared to that of the standard control sediment used by the laboratory as part of the laboratory's standard operating procedures. Statistically significant decreases in survival and/or growth relative to controls will be considered a COEC-related effect when they can be related to exposures associated with COECs in the sediments.

4.3.2 Measures of Effects Associated with Assessment Endpoint 2

Survival, growth, and reproduction of local populations of aquatic wildlife populations represented by bald eagles, mallard duck, great blue heron, muskrat, and river otter or racoon (incorporates the assessment of benthic macroinvertebrates)

The assessment will use six measures of effects (some species-specific) to evaluate risks to the wildlife assessment endpoint. Food-chain modeling will estimate exposure to the four wildlife species.

Wildlife either sighted during prior site visits or likely to occur based on the evaluation of habitats was used to identify representative wildlife species.

Table 2. Representative Aquatic Wildlife Species Proposed for Assessing Risks of COECs to Wildlife.

Species	Feeding Guild	Primary Habitat	Use in ERA
Bald Eagle	Eats fish and other small animals	Aquatic	Evaluate exposure to COECs in aquatic food webs
Great Blue Heron	Eats fish and other small animals	Aquatic	Evaluate exposure to COECs in aquatic food webs
Mallard Duck	Eats plants and macroinvertebrates	Aquatic	Evaluate exposure to COECs in aquatic plants and macroinvertebrates
Muskrat	Eats plants and some macroinvertebrates (e.g., clams)	Aquatic	Evaluate exposure to COECs in aquatic plants and in macroinvertebrates
River otter or raccoon	Eats fish, other small animals and some macroinvertebrates	Aquatic	Evaluate exposures to COECs in fish and macroinvertebrates

The assessment will use exposure models to evaluate different routes of exposure including ingestion of water, sediment and food (plants, benthic macroinvertebrates and fish). This subsection describes the measures of effects and the general model used to evaluate exposures.

Measure of effect 2a: Wildlife species composition and habitat use.

Purpose and Rationale. The measure of effect directly examines the receptors – wildlife – to estimate if they are using the various sectors of Dead Creek. The assessment is a measure of the degree to which local and migratory wildlife use the habitat and the extent to which it supports their needs.

Approach: The assessment will compare the composition and habitat use by wildlife to observations of species composition of wildlife and their use of a reference area. A wildlife biologist will make these observations This type of survey is qualitative. The strength of the analysis is that it indicates whether Dead Creek can support wildlife species comparable to unaffected reference areas. However, because of the qualitative nature of the observations and the high natural variability that can exist in wildlife populations, direct observations may not reveal effects.

Measure of effect 2b: Concentrations of COECs in aquatic and marsh plants.

This measure of effect will be conducted within Dead Creek Segments B to F, and M and the reference areas.

This plan recommends collecting aquatic and marsh plants for analysis of COECs because some species of wildlife using Dead Creek and wetlands eat aquatic and marsh plants. This is a potentially complete exposure pathway for wildlife. The QAPP/FSP describes the details of the aquatic and marsh plant collection and analysis.

Purpose and Rationale. The assessment will compare measures of COECs in submerged aquatic and emergent marsh vegetation within Dead Creek and a reference water body. Waterfowl graze on aquatic plants. Herbivorous mammals such as the muskrat eat aquatic and emergent vegetation in wetlands. If plants take up metals and PAHs from the water or sediments, waterfowl and herbivorous mammals could be exposed to these COECs in their diet.

As the QAPP/FSP indicates, fruiting bodies/leaves and roots from aquatic plants and emergent plants will be composited separately.

Approach: The endpoint will be evaluated in multi-pathway exposure models for the mallard and the muskrat that considers sediment, water, and food. Exposures to water fowl and herbivorous mammals within the Dead Creek sectors will be compared to: 1) appropriate NOAEL and LOAEL values, and 2) exposures that occur in reference areas. The COEC concentrations measured in submergent aquatic plants will be used to evaluate potential dietary exposures to the mallard, which graze on aquatic plants. The COEC concentrations measured in submergent and emergent plants will be used to evaluate potential dietary exposures to the muskrat, which graze on greens.

Measure of effect 2c: Concentration of COECs in surface waters.

Purpose and Rationale. Many wildlife species will use Dead Creek and associated wetlands as a drinking water source. The presence of COECs in water could be a source of exposure to these species. This measure of effect examines this potential route of exposure.

Approach: This endpoint will be evaluated in multi-pathway exposure models for the mallard and the great blue heron that considers sediment, water, and food. The assessment will compare exposures to these selected representative species within the Dead Creek sectors to: 1) appropriate NOAEL and LOAEL values, and 2) exposures that occur in reference areas.

Measure of effect 2d: Concentration of COECs in fish.

Purpose and Rationale: Some wildlife species such as the bald eagle, the great blue heron eat primarily fish. This measure of effect evaluates this potential route of exposure.

Approach. Fish will be collected and analyzed for COECs. The COEC levels measured in fish will be used in the multi-pathway exposure model for the bald eagle and the great blue heron that considers sediment, water, and food. Exposures to the bald eagle and the great blue heron within the Dead Creek Sectors will be compared to: 1) appropriate NOAEL and LOAEL values, and 2) exposures that occur in reference areas.

Measure of effect 2e: Concentration of metals and PAHs in benthic macroinvertebrates (including crayfish).

Purpose and Rationale. Waterfowl (such as the mallard) and mammals (such as the muskrat) eat benthic macroinvertebrates as a portion of their diet. This measure of effect evaluates this potential route of exposure.

Approach: Benthic macroinvertebrates and crayfish will be collected and analyzed for COECs. The COEC levels measured in benthic macroinvertebrates will be used in a multi-pathway exposure model for the mallard and for the muskrat that considers sediment, water, and food. Exposures to water-fowl and mammals within the Dead Creek Sectors will be compared to: 1) appropriate NOAEL and LOAEL values, and 2) exposures that occur in reference areas.

4.3.3 Measures of effects Associated with Assessment Endpoint 3

Assessment Endpoint 3 is survival, growth, and reproduction of individuals within the local bald eagle population in Creek Sectors B through F, and M.

Measure of effect 3a: Concentration of COECs in forage fish for use in evaluating exposure via the food chain.

Purpose and Rationale. Bald eagle may use fish in Dead Creek and associated wetlands as food. The presence of COECs in fish could be a source of exposure to this species. This measure of effect examines this potential route of exposure.

Approach: This endpoint will be evaluated in a an exposure model for the bald eagle. The assessment will compare exposures to: 1) appropriate NOAEL and LOAEL values, and 2) exposures that occur in reference areas.

4.3.4 Measures of Effect Associated with Assessment Endpoint 4

Measure of effect 4a: COEC concentrations in soil samples from Creek bank and floodplain as compared to applicable soil screening levels for protection of wildlife, plants, and soil dwelling invertebrates.

Purpose and Rationale. Soil concentrations provide a measure of exposure, and screening level criteria indicate levels above which effects may occur. This measure of effect will evaluate the potential for soil concentrations of COECs in Dead Creek banks and floodplains to cause adverse effects.

Approach: The assessment will compare measured concentrations of total contaminant concentrations in soils to existing (e.g. Oak Ridge National Laboratory Toxicological Benchmarks for Wildlife; Oak Ridge National Laboratory Toxicological Benchmarks for Screening Potential Effects on Terrestrial Plants; Oak Ridge National Laboratory Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Processes).

We will also use any terrestrial soil screening concentrations or benchmarks developed by the time the proposed work occurs.

4.4 Structure of Wildlife Exposure Models

The general form of the wildlife exposure model is:

Exposure Dose (oral) = $[Conc_{food} * Ingest_{food}] + [RAF * Conc_{soil} * Sediment_{diet} * Ingest_{food}]$

Where:

Exposure Dose (oral) = dose of a COEC in ug/g-day

$Conc_{food}$ = concentration of the COEC (ug/g) in the food (measured or estimated); this is the average and the 95 % CL concentration in the relevant exposure zone – an area determined by the size and locations of foraging areas. The average is the appropriate statistic because ecological receptors integrate exposure over their foraging areas. We will also use the 95% CL and calculate risk from this exposure separately.

$Ingest_{food}$ = amount of food ingested per day normalized to body weight (g/g-day) and usually expressed in terms of wet weight/wet weight

RAF – relative availability factor for COECs in sediment via incidental ingestion of sediment

$Conc_{sediment}$ = concentration ug/g in the relevant exposure zone; this is estimated as an average concentration in the exposure zone for chronic exposure and effects, and as upper bound (e.g., maximum or hot spot concentrations) for evaluation of short-term or acute exposures. The average is the appropriate statistic because ecological receptors integrate exposure over their foraging areas.

$Sediment_{diet}$ = fraction of sediment in the diet; the product of this number and $Ingest_{food}$ yields an estimate of the amount of sediment that is incidentally ingested

Sediments that are collected within shallow water (< 3 feet deep) in open water areas of Dead Creek, sediments along the bank, and soils adjacent to the creek (where available) will be used to assess incidental sediment ingestion. Sediments collected from the top 5 cm will be considered accessible to aquatic wildlife.

Because exposures to COECs associated with diet and sediment will be higher than surface water ingestion, this exposure pathway will not be estimated within the model. However, we will compare National Recommenced Water Quality Criteria for the protection of wildlife to surface water concentrations where such data and corresponding criteria are available.

Model Application

The model will be applied in several ways:

1. Acute exposure: The potential for acute exposure is considered without incorporating information on foraging area. The rationale for this is that an acute exposure involves a short-term feeding or exposure event that does not have to be averaged over the foraging area. When calculating the potential for acute exposure, maximum concentrations are used within the geographically defined local population or Threatened and Endangered species. Locations that exceed exposure concentrations that could result in acute toxic effects are identified.

2. Chronic exposure to individuals: The potential for chronic exposure to individuals is considered by determining both the maximum concentration and calculating an average concentration of food and sediments at spatial scales defined by the foraging areas of the species. For example, exposure concentrations for a species with a foraging area of 10 ha would be determined by averaging the food and sediments concentrations within this spatial scale. A species with a foraging area of 0.1 ha would have an averaging area that is 100 times less.

3. Chronic exposure to the population. The local population as defined above is made up of a number of individuals. Because the success of the local population is not dependent on the risk to any particular individual, a wildlife exposure model will also be used to estimate chronic exposures to individuals throughout the local population. These estimates take into account the spatial distribution of COECs, the foraging areas of the individuals within the species, and possible spatial distributions of these individuals within the area that defines the local population. Results are used to estimate risks as a percentage of the local population. The local population is confined to individual animals that use Dead Creek and its associated wetlands and small ponds.

4. Acute and chronic exposures to the Bald Eagle. Because the Bald eagle is rare and the risk to the individual is considered, the wildlife exposure model will also be used to estimate exposures to the individual.

The Waterways Experimental Station on-line database;

The Society of Environmental Toxicology and Chemistry's recently published database of residual effect levels (Jarvinen and Ankley, 1999);

Computer on-line data bases, such as Toxline, Biosis, Wildlife Fisheries Review, Pollution Abstracts, and Environmental Abstracts.

When reviewing the toxicological literature and selecting the most appropriate TRV, several factors will be considered including:

- Taxonomic relationship between the test animal and the indicator species;
- Use of laboratory or domesticated animals;
- Ecological relevance of the study endpoints—Studies with chronic toxicity endpoints, such as reproductive, growth, behavior and developmental endpoints, are targeted. Sensitive endpoints, such as reproductive or developmental toxicity, are preferentially selected because they are closely related to the selected assessment endpoints (*e.g.*, population declines);
- Toxicological studies in which the chemical was administered through the diet of the test species are preferred over studies using other oral dosing methods, such as gavage; and
- Long-term studies representing chronic exposure are preferentially selected.

Dietary concentrations (mg/kg diet) cited in the reference study will be converted to mg/kg BW/day. If the daily dose reported in the selected study is a Lowest Adverse Effect Level (LOAEL), then the LOAEL will be converted to a NOAEL using a factor of 10. Interspecies correlations will be considered.

If toxicological animal studies are not available for a particular COEC, then QSAR will be considered and a surrogate chemical will be selected when possible. If the COEC can not be assessed quantitatively, then the risk to the COEC will be qualitatively discussed.

Species specific toxicity factors may not be available for all COEC. In such cases, the assessment will apply the following sequential steps to develop a toxicity factor.

- Use a toxicity value or criterion for the protection of exposed organisms, if an appropriate state or federal agency has proposed it.

- If criteria are unavailable, but appropriate data are available on NOAELs for the receptor species, use the lowest NOAEL for the receptor species.

- If an appropriate NOAEL is unavailable for the receptor species, use a NOAEL for a species which is phylogenetically similar (within the same genera or family) and ecologically similar to the selected receptor species (e.g. from the same family of birds or mammals).

- If an appropriate NOAEL is unavailable for a phylogenetically similar species, extrapolate from an appropriate NOAEL value for other species (as closely related as possible) by dividing by 5 to account for extrapolations between families and by 10 to account for extrapolations between orders. Use the lowest appropriate NOAEL whenever several studies are available.

- In the absence of an appropriate NOAEL, if a LOAEL is available for a phylogenetically similar species, divide it by 10 to account for a LOAEL to NOAEL conversion. The LOAEL to NOAEL conversion is similar to EPA's derivation of human health RfD values, where LOAEL studies are adjusted by a factor of 10 to estimate NOAEL values.

- For calculating chronic toxicity values from data for sub-chronic tests, divide the resultant LOAEL or NOAEL by an additional factor of 10. This is consistent with the methodology used to derive human RfD values. EPA has no clear guidance on the dividing line between subchronic and chronic exposures. The present risk assessment follows recently developed guidance (Sample et al., 1996) which considers 10 weeks to be the minimum time for chronic exposure of birds and 1 year for chronic exposure of mammals. In addition to duration of exposure, the time when exposure to contaminant occurs is critical.

- In cases where NOAELs are available as a dietary concentration (e.g., mg contaminant per kg food), calculate a daily dose for birds or mammals based on standard estimates of food intake rates and body weights (USEPA, 1993c).

6.0 DISCUSSION OF UNCERTAINTIES AND EXPOSURE ASSUMPTIONS

Sources of uncertainty and variability within the ERA will be identified. The impact associated with these uncertainties will be qualitatively addressed. Sensitivity analyses will be conducted for the important exposure parameters that are used in the wildlife exposure models and for the TRVs that are used to determine risk to the representative wildlife species.

7.0 REFERENCES

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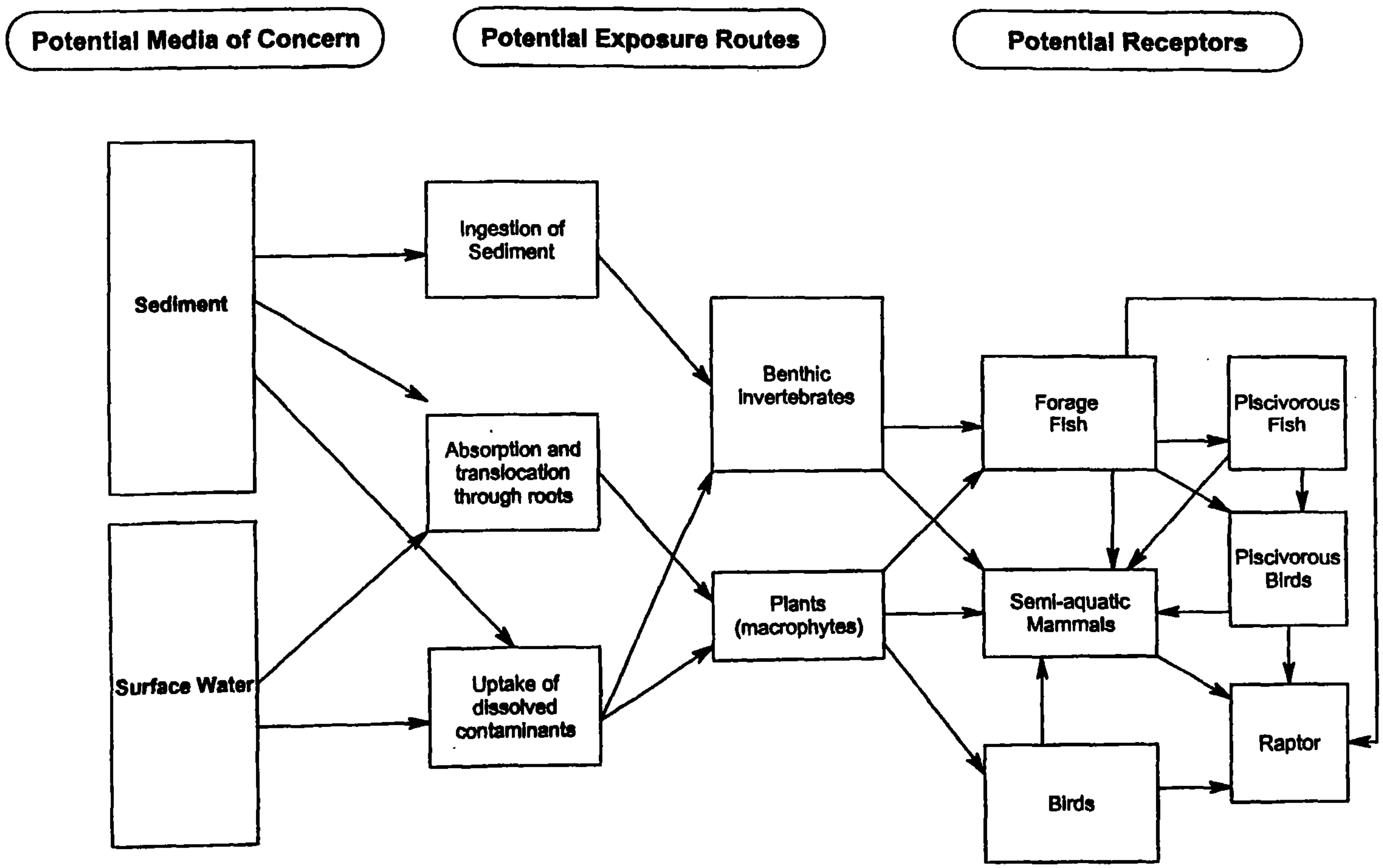
Figure 1-C-1: Preliminary Ecological Conceptual Model

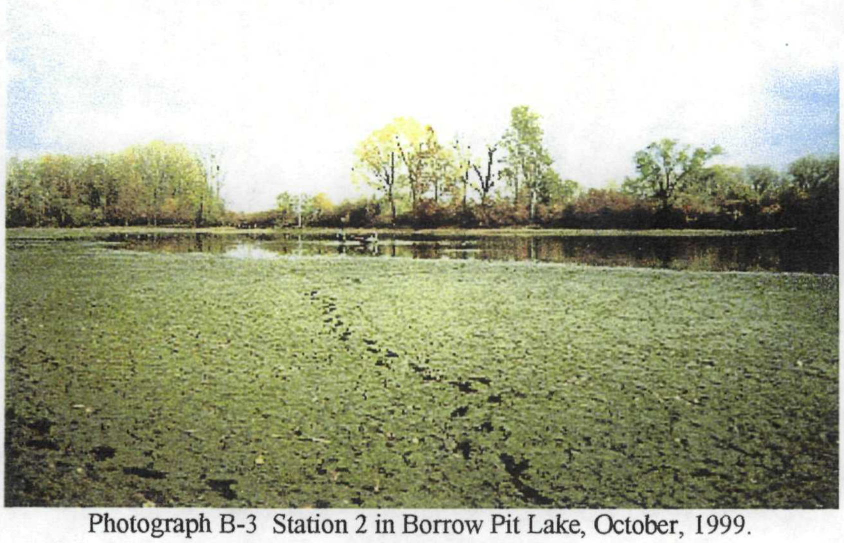


APPENDIX B

PHOTOGRAPHS

Photograph B-1 Dead Creek Section F, October 1999.

Photograph B-2 Low water level in Borrow Pit Lake, October, 1999.



Photograph B-3 Station 2 in Borrow Pit Lake, October, 1999.

Photograph B-4 Station 3 in Borrow Pit Lake, October, 1999.

Photograph B-5 Beach seining in reference location PDC-1 (Prairie DuPont Creek), October, 1999.

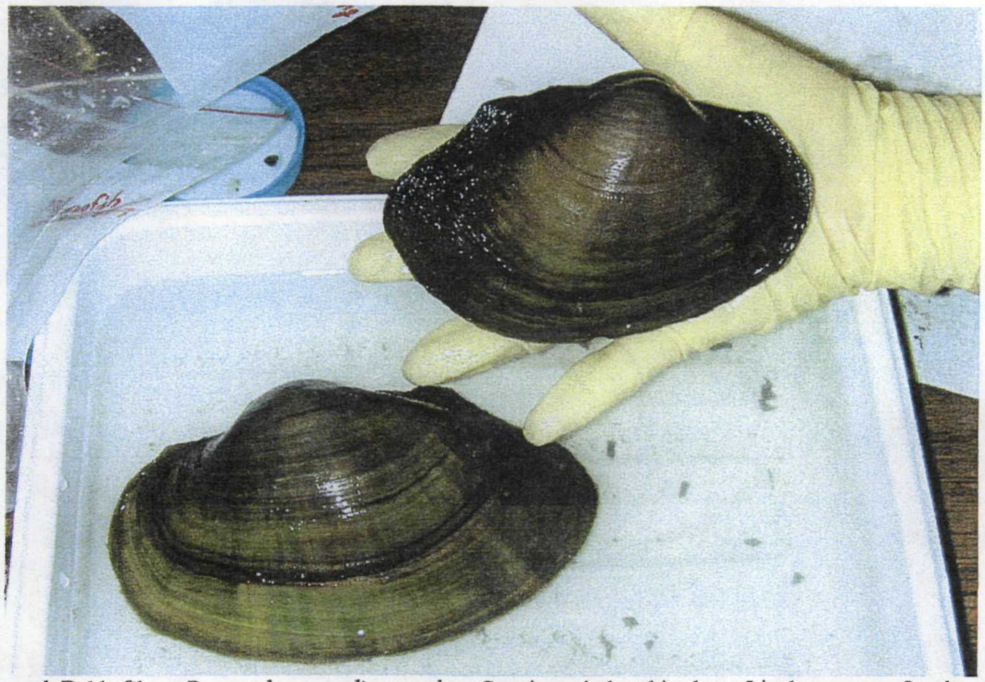

Photograph B-6 Reference location PDC-1 (Prairie DuPont Creek), October, 1999.


Photograph B-7 Reference location Ref2-1 (Creek Portion), October, 1999.


Photograph B-8 Reference location Ref2-2 (Lake Portion), October, 1999.

Photograph B-9 Vegetation, *Ranunculus reptans*, sample, covered with Duckweed, being washed , October, 1999.

Photograph B-10 Shrimp, *Palaemonetes kadiakensis*, (diameter of sieve is 8 inches), October 1999.



Photograph B-11 Clam, *Pyganodon grandis*, samples. Specimen in hand is about 5 inches across, October 1999.

APPENDIX C

SUMMARY STATISTICS FOR DATA USED IN ECOLOGICAL RISK ASSESSMENT

SURFACE WATER SUMMARY STATISTICS

Site Surface Water Summary Statistics
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/l						
2,4,5-T	6		0%			0.25
2,4,5-TP (Silvex)	6		0%			0.25
2,4-D	6		0%			0.25
2,4-DB	6		0%			0.25
Dalapon	*6*		*0%*			*60*
Dicamba	6		0%			0.60
Dichloroprop	6		0%			3.0
Dinoseb	6		0%			3.0
MCPA	6		0%			60
MCPP	6		0%			60
Pentachlorophenol	6		0%			0.50
Metals, mg/l						
Aluminum	6	6	100%	0.039	3.4	0.92
Antimony	6		0%			0.010
Arsenic	6	5	83%	0.0032	0.015	0.0080
Barium	6	6	100%	0.045	0.32	0.14
Beryllium	6		0%			0.0020
Cadmium	6		0%			0.0025
Calcium	6	6	100%	47	89	58
Chromium	6	1	17%	0.0041	0.0041	0.0049
Cobalt	6	1	17%	0.0015	0.0015	0.0044
Copper	6	6	100%	0.0016	0.012	0.0052
Cyanide, Total	6		0%			0.0050
Iron	6	6	100%	0.5	8.7	2.3
Lead	6	5	83%	0.002	0.02	0.0056
Magnesium	6	6	100%	26	33	31
Manganese	6	6	100%	0.082	1.7	0.39
Mercury	6		0%			0.00010
Molybdenum	6	3	50%	0.0028	0.004	0.0042
Nickel	6	6	100%	0.0069	0.021	0.013
Potassium	6	6	100%	5.1	7.6	6.6
Selenium	6		0%			0.0050
Silver	6		0%			0.0050
Sodium	6	6	100%	21	24	22
Thallium	6		0%			0.0050
Vanadium	6	4	67%	0.003	0.014	0.0072
Zinc	6	6	100%	0.0073	0.075	0.035
Fluoride (mg/l)	6	6	100%	0.24	0.29	0.26
Hardness as CaCO3 (mg/l)	6	6	100%	220	350	272
Ortho-Phosphate-P (mg/l)	6	6	100%	0.063	0.83	0.25
pH	6	6	100%	7.4	9.7	8.5
Suspended Solids (mg/l)	6	5	83%	8	160	46
Total Dissolved Solids	6	6	100%	280	480	358
Total Phosphorus (mg/l)	6	6	100%	0.13	1.2	0.37
PCB, ug/l						
Decachlorobiphenyl	6		0%			0.25
Dichlorobiphenyl	6		0%			0.050
Heptachlorobiphenyl	6		0%			0.15
Hexachlorobiphenyl	6		0%			0.10
Monochlorobiphenyl	6		0%			0.050
Nonachlorobiphenyl	6		0%			0.25
Octachlorobiphenyl	6		0%			0.15
Pentachlorobiphenyl	6		0%			0.10
Tetrachlorobiphenyl	6		0%			0.10
Trichlorobiphenyl	6		0%			0.050
Total PCBs	6		0%			0.050
Pesticides, ug/l						
4,4'-DDD	6		0%			0.050
4,4'-DDE	6		0%			0.050
4,4'-DDT	6		0%			0.050
Total DDT	6		0%			0.050
Aldrin	6		0%			0.025
Alpha Chlordane	6		0%			0.025
alpha-BHC	6	2	33%	0.00047	0.001	0.013
beta-BHC	6	3	50%	0.0096	0.02	0.010
delta-BHC	6	2	33%	0.00013	0.0022	0.0044

Site Surface Water Summary Statistics
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dieldrin	6	1	17%	0.001	0.001	0.042
Endosulfan I	6	2	33%	0.0015	0.0024	0.017
Endosulfan II	6		0%			0.050
Endosulfan sulfate	6	1	17%	0.0032	0.0032	0.042
Endrin	6	1	17%	0.00095	0.00095	0.042
Endrin aldehyde	6	2	33%	0.0016	0.0032	0.034
Endrin ketone	6	1	17%	0.0027	0.0027	0.042
Gamma Chlordane	6		0%			0.025
gamma-BHC (Lindane)	6	2	33%	0.0024	0.0038	0.007
Heptachlor	6	3	50%	0.0022	0.0029	0.014
Heptachlor epoxide	6	2	33%	0.0009	0.00096	0.017
Methoxychlor	6		0%			0.25
Toxaphene	6		0%			2.5
SVOCs, ug/l						
1,2,4-Trichlorobenzene	6		0%			5.0
1,2-Dichlorobenzene	6		0%			5.0
1,3-Dichlorobenzene	6		0%			5.0
1,4-Dichlorobenzene	6		0%			5.0
2,2'-Oxybis(1-	6		0%			5.0
2,4,5-Trichlorophenol	6		0%			5.0
2,4,6-Trichlorophenol	6		0%			1.1
2,4-Dichlorophenol	6		0%			5.0
2,4-Dinitrophenol	6		0%			7.0
2,4-Dinitrotoluene	6		0%			5.0
2,6-Dinitrotoluene	6		0%			5.0
2-Chloronaphthalene	6		0%			5.0
2-Chlorophenol	6		0%			5.0
2-Methylnaphthalene	6		0%			5.0
2-Methylphenol (o-cresol)	6		0%			5.0
2-Nitroaniline	6		0%			25
2-Nitrophenol	6		0%			5.0
3,3'-Dichlorobenzidine	6		0%			10
3-Methylphenol/4-	6		0%			5.0
3-Nitroaniline	6		0%			25
4,6-Dinitro-2-methylphenol	6		0%			6.5
4-Bromophenylphenyl ether	6		0%			0.50
4-Chloro-3-methylphenol	6		0%			5.0
4-Chloroaniline	6		0%			10
4-Chlorophenylphenyl ether	6		0%			5.0
4-Nitroaniline	6		0%			25
4-Nitrophenol	6		0%			25
Acenaphthene	6		0%			5.0
Acenaphthylene	6		0%			5.0
Anthracene	6		0%			5.0
Benzo(a)anthracene	6		0%			5.0
Benzo(a)pyrene	6		0%			5.0
Benzo(b)fluoranthene	6		0%			5.0
Benzo(g,h,i)perylene	6		0%			5.0
Benzo(k)fluoranthene	6		0%			5.0
bis(2-	6		0%			5.0
bis(2-Chloroethyl)ether	6		0%			5.0
bis(2-Ethylhexyl)phthalate	6		0%			0.90
Butylbenzylphthalate	6		0%			5.0
Carbazole	6		0%			5.0
Chrysene	6		0%			5.0
Di-n-butylphthalate	6		0%			5.0
Di-n-octylphthalate	6		0%			5.0
Dibenzo(a,h)anthracene	6		0%			5.0
Dibenzofuran	6		0%			5.0
Diethylphthalate	6		0%			5.0
Dimethylphthalate	6		0%			5.0
Fluoranthene	6	1	17%	0.7	0.7	4.3
Fluorene	6		0%			0.50
Hexachlorobenzene	6		0%			5.0
Hexachlorobutadiene	6		0%			5.0
Hexachlorocyclopentadien	6		0%			5.0
Hexachloroethane	6		0%			0.95
Indeno(1,2,3-cd)pyrene	6		0%			5.0
Isophorone	6		0%			5.0

Appendix C-1.1

Site Surface Water Summary Statistics
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
N-Nitroso-di-n-propylamine	6		0%			5.0
N-Nitrosodiphenylamine	6		0%			2.5
Naphthalene	6		0%			5.0
Nitrobenzene	6		0%			1.8
Pentachlorophenol	6		0%			2.5
Phenanthrene	6	1	17%	0.7	0.7	4.3
Phenol	6		0%			5.0
Pyrene	6		0%			5.0
Total PAHs	6	1	17%	1.4	1.4	4.4
VOCs, ug/l						
1,1,1-Trichloroethane	6		0%			2.5
1,1,2,2-Tetrachloroethane	6		0%			2.5
1,1,2-Trichloroethane	6		0%			2.5
1,1-Dichloroethane	6		0%			2.5
1,1-Dichloroethene	6		0%			2.5
1,2-Dichloroethane	6		0%			2.5
1,2-Dichloropropane	6		0%			2.5
2-Butanone (MEK)	6		0%			13
2-Hexanone	6		0%			13
4-Methyl-2-pentanone	6		0%			13
Acetone	6	3	50%	13	18	20
Benzene	6	1	17%	1.7	1.7	0.78
Bromodichloromethane	6		0%			2.5
Bromoform	6		0%			2.5
Bromomethane (Methyl	6		0%			4.9
Carbon disulfide	6		0%			2.5
Carbon tetrachloride	6		0%			2.5
Chlorobenzene	6		0%			2.5
Chloroethane	6		0%			5.0
Chloroform	6		0%			2.5
Chloromethane	6		0%			5.0
cis-1,3-Dichloropropene	6		0%			0.5
Cis/Trans-1,2-	6		0%			2.5
Dibromochloromethane	6		0%			2.5
Ethylbenzene	6		0%			2.5
Methylene chloride	6		0%			2.4
Styrene	6		0%			2.5
Tetrachloroethene	6		0%			2.5
Toluene	6		0%			2.5
trans-1,3-Dichloropropene	6		0%			2.5
Trichloroethene	6		0%			1.4
Vinyl chloride	6		0%			5
Xylenes, Total	6		0%			2.5

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrat

Appendix C-1.2

Site Surface Water Dioxin Data Summary
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/l						
1,2,3,4,6,7,8,9-OCDD	6	5	83%	5.73E-04	1.43E-03	7.08E-04
1,2,3,4,6,7,8,9-OCDF	6	5	83%	5.03E-05	2.60E-04	1.21E-04
1,2,3,4,6,7,8-HpCDD	6	4	67%	4.42E-05	6.92E-05	4.41E-05
1,2,3,4,6,7,8-HpCDF	6	6	100%	1.34E-05	5.05E-05	2.72E-05
1,2,3,4,7,8,9-HpCDF	6	1	17%	5.48E-04	5.48E-04	9.45E-05
1,2,3,4,7,8-HxCDD	6		0%			2.73E-06
1,2,3,4,7,8-HxCDF	6	1	17%	2.40E-05	2.40E-05	6.05E-06
1,2,3,6,7,8-HxCDD	6		0%			2.56E-06
1,2,3,6,7,8-HxCDF	6	1	17%	8.90E-06	8.90E-06	3.39E-06
1,2,3,7,8,9-HxCDD	6		0%			2.66E-06
1,2,3,7,8,9-HxCDF	6		0%			2.67E-06
1,2,3,7,8-PeCDD	6		0%			3.19E-06
1,2,3,7,8-PeCDF	6		0%			2.04E-06
2,3,4,6,7,8-HxCDF	6		0%			2.38E-06
2,3,4,7,8-PeCDF	6		0%			2.15E-06
2,3,7,8-TCDD	6		0%			2.96E-06
2,3,7,8-TCDF	6		0%			2.52E-06
Total HpCDD	6	4	67%	9.35E-05	1.28E-04	9.07E-05
Total HpCDF	6	5	83%	4.16E-05	6.00E-04	1.65E-04
Total HxCDD	6	2	33%	6.20E-06	9.02E-05	1.91E-05
Total HxCDF	6	2	33%	2.49E-05	5.81E-04	1.04E-04
Total PeCDD	6		0%			3.19E-06
Total PeCDF	6		0%			2.10E-06
Total TCDD	6		0%			2.96E-06
Total TCDF	6		0%			2.52E-06

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-1.3

Dead Creek Sector F Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/l						
2,4,5-T	3		0%			0.25
2,4,5-TP (Silvex)	3		0%			0.25
2,4-D	3		0%			0.25
2,4-DB	3		0%			0.25
Dalapon	3		0%			60
Dicamba	3		0%			0.60
Dichloroprop	3		0%			3.0
Dinoseb	3		0%			3.0
MCPA	3		0%			60
MCPP	3		0%			60
Pentachlorophenol	3		0%			0.50
Metals, mg/l						
Aluminum	3	3	100%	0.039	0.55	0.25
Antimony	3		0%			0.010
Arsenic	3	2	67%	0.0032	0.0049	0.0044
Barium	3	3	100%	0.12	0.13	0.13
Beryllium	3		0%			0.0020
Cadmium	3		0%			0.0025
Calcium	3	3	100%	52	53	53
Chromium	3		0%			0.0050
Cobalt	3		0%			0.0050
Copper	3	3	100%	0.0016	0.012	0.0052
Cyanide, Total	3		0%			0.0050
Iron	3	3	100%	0.5	1.0	0.68
Lead	3	2	67%	0.0022	0.0037	0.0028
Magnesium	3	3	100%	30	33	32
Manganese	3	3	100%	0.082	0.14	0.11
Mercury	3		0%			0.00010
Molybdenum	3	1	33%	0.0028	0.0028	0.0043
Nickel	3	3	100%	0.0069	0.021	0.014
Potassium	3	3	100%	6.4	6.9	6.6
Selenium	3		0%			0.0050
Silver	3		0%			0.0050
Sodium	3	3	100%	21	22	21
Thallium	3		0%			0.0050
Vanadium	3	1	33%	0.003	0.0030	0.0043
Zinc	3	3	100%	0.0073	0.075	0.039
Fluoride (mg/l)	3	3	100%	0.24	0.27	0.25
Hardness as CaCO3 (mg/l)	3	3	100%	260	270	263
Ortho-Phosphate-P (mg/l)	3	3	100%	0.063	0.12	0.092
pH	3	3	100%	7.4	8.6	7.9
Suspended Solids (mg/l)	3	2	67%	8	12	7.5
Total Dissolved Solids	3	3	100%	330	360	347
Total Phosphorus (mg/l)	3	3	100%	0.13	0.18	0.15
PCB, ug/l						
Decachlorobiphenyl	3		0%			0.25
Dichlorobiphenyl	3		0%			0.050
Heptachlorobiphenyl	3		0%			0.15
Hexachlorobiphenyl	3		0%			0.10
Monochlorobiphenyl	3		0%			0.050
Nonachlorobiphenyl	3		0%			0.25
Octachlorobiphenyl	3		0%			0.15
Pentachlorobiphenyl	3		0%			0.10
Tetrachlorobiphenyl	3		0%			0.10
Trichlorobiphenyl	3		0%			0.050
Total PCBs	3		0%			0.050

Appendix C-1.3

Dead Creek Sector F Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Pesticides, ug/l						
4,4'-DDD	3		0%			0.050
4,4'-DDE	3		0%			0.050
4,4'-DDT	3		0%			0.050
Total DDT	3		0%			0.050
Aldrin	3		0%			0.025
Alpha Chlordane	3		0%			0.025
alpha-BHC	3		0%			0.020
beta-BHC	3		0%			0.0070
delta-BHC	3		0%			0.0060
Dieldrin	3		0%			0.050
Endosulfan I	3		0%			0.025
Endosulfan II	3		0%			0.050
Endosulfan sulfate	3		0%			0.050
Endrin	3		0%			0.050
Endrin aldehyde	3		0%			0.050
Endrin ketone	3		0%			0.050
Gamma Chlordane	3		0%			0.025
gamma-BHC (Lindane)	3		0%			0.010
Heptachlor	3		0%			0.025
Heptachlor epoxide	3		0%			0.025
Methoxychlor	3		0%			0.25
Toxaphene	3		0%			2.5
SVOCs, ug/l						
1,2,4-Trichlorobenzene	3		0%			5.0
1,2-Dichlorobenzene	3		0%			5.0
1,3-Dichlorobenzene	3		0%			5.0
1,4-Dichlorobenzene	3		0%			5.0
2,2'-Oxybis(1-	3		0%			5.0
2,4,5-Trichlorophenol	3		0%			5.0
2,4,6-Trichlorophenol	3		0%			1.1
2,4-Dichlorophenol	3		0%			5.0
2,4-Dinitrophenol	3		0%			7.0
2,4-Dinitrotoluene	3		0%			5.0
2,6-Dinitrotoluene	3		0%			5.0
2-Chloronaphthalene	3		0%			5.0
2-Chlorophenol	3		0%			5.0
2-Methylnaphthalene	3		0%			5.0
2-Methylphenol (o-cresol)	3		0%			5.0
2-Nitroaniline	3		0%			25
2-Nitrophenol	3		0%			5.0
3,3'-Dichlorobenzidine	3		0%			10
3-Methylphenol/4-	3		0%			5.0
3-Nitroaniline	3		0%			25
4,6-Dinitro-2-methylphenol	3		0%			6.5
4-Bromophenylphenyl	3		0%			0.50
4-Chloro-3-methylphenol	3		0%			5.0
4-Chloroaniline	3		0%			10
4-Chlorophenylphenyl	3		0%			5.0
4-Nitroaniline	3		0%			25
4-Nitrophenol	3		0%			25
Acenaphthene	3		0%			5.0
Acenaphthylene	3		0%			5.0
Anthracene	3		0%			5.0
Benzo(a)anthracene	3		0%			5.0
Benzo(a)pyrene	3		0%			5.0
Benzo(b)fluoranthene	3		0%			5.0
Benzo(g,h,i)perylene	3		0%			5.0
Benzo(k)fluoranthene	3		0%			5.0
bis(2-	3		0%			5.0
bis(2-Chloroethyl)ether	3		0%			5.0
bis(2-Ethylhexyl)phthalate	3		0%			0.90
Butylbenzylphthalate	3		0%			5.0
Carbazole	3		0%			5.0
Chrysene	3		0%			5.0

Dead Creek Sector F Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Di-n-butylphthalate	3		0%			5.0
Di-n-octylphthalate	3		0%			5.0
Dibenzo(a,h)anthracene	3		0%			5.0
Dibenzofuran	3		0%			5.0
Diethylphthalate	3		0%			5.0
Dimethylphthalate	3		0%			5.0
Fluoranthene	3	1	33%	0.7	0.7	3.6
Fluorene	3		0%			0.50
Hexachlorobenzene	3		0%			5.0
Hexachlorobutadiene	3		0%			5.0
Hexachlorocyclopentadien	3		0%			5.0
Hexachloroethane	3		0%			0.95
Indeno(1,2,3-cd)pyrene	3		0%			5.0
Isophorone	3		0%			5.0
N-Nitroso-di-n-propylamine	3		0%			5.0
N-Nitrosodiphenylamine	3		0%			2.5
Naphthalene	3		0%			5.0
Nitrobenzene	3		0%			1.8
Pentachlorophenol	3		0%			2.5
Phenanthrene	3	1	33%	0.7	0.7	3.6
Phenol	3		0%			5.0
Pyrene	3		0%			5.0
Total PAHs	3	1	33%	1.4	1.4	3.8
VOCs, ug/l						
1,1,1-Trichloroethane	3		0%			2.5
1,1,2,2-Tetrachloroethane	3		0%			2.5
1,1,2-Trichloroethane	3		0%			2.5
1,1-Dichloroethane	3		0%			2.5
1,1-Dichloroethene	3		0%			2.5
1,2-Dichloroethane	3		0%			2.5
1,2-Dichloropropane	3		0%			2.5
2-Butanone (MEK)	3		0%			13
2-Hexanone	3		0%			13
4-Methyl-2-pentanone	3		0%			13
Acetone	3		0%			25
Benzene	3	1	33%	1.7	1.7	0.97
Bromodichloromethane	3		0%			2.5
Bromoform	3		0%			2.5
Bromomethane (Methyl	3		0%			4.9
Carbon disulfide	3		0%			2.5
Carbon tetrachloride	3		0%			2.5
Chlorobenzene	3		0%			2.5
Chloroethane	3		0%			5.0
Chloroform	3		0%			2.5
Chloromethane	3		0%			5.0
cis-1,3-Dichloropropene	3		0%			0.50
Cis/Trans-1,2-	3		0%			2.5
Dibromochloromethane	3		0%			2.5
Ethylbenzene	3		0%			2.5
Methylene chloride	3		0%			2.4
Styrene	3		0%			2.5
Tetrachloroethene	3		0%			2.5
Toluene	3		0%			2.5
trans-1,3-Dichloropropene	3		0%			2.5
Trichloroethene	3		0%			1.4
Vinyl chloride	3		0%			5.0
Xylenes, Total	3		0%			2.5

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentra

Appendix C-1.4

Dioxin Surface Water Data Summary for Dead Creek Sector F
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/l						
1,2,3,4,6,7,8,9-OCDD	3	2	67%	5.73E-04	6.17E-04	4.24E-04
1,2,3,4,6,7,8,9-OCDF	3	3	100%	8.17E-05	2.60E-04	1.91E-04
1,2,3,4,6,7,8-HpCDD	3	2	67%	6.29E-05	6.92E-05	4.71E-05
1,2,3,4,6,7,8-HpCDF	3	3	100%	1.34E-05	5.05E-05	3.63E-05
1,2,3,4,7,8,9-HpCDF	3	1	33%	5.48E-04	5.48E-04	1.84E-04
1,2,3,4,7,8-HxCDD	3		0%			2.12E-06
1,2,3,4,7,8-HxCDF	3	1	33%	2.40E-05	2.40E-05	8.98E-06
1,2,3,6,7,8-HxCDD	3		0%			1.98E-06
1,2,3,6,7,8-HxCDF	3	1	33%	8.90E-06	8.90E-06	3.88E-06
1,2,3,7,8,9-HxCDD	3		0%			2.07E-06
1,2,3,7,8,9-HxCDF	3		0%			1.88E-06
1,2,3,7,8-PeCDD	3		0%			3.13E-06
1,2,3,7,8-PeCDF	3		0%			1.80E-06
2,3,4,6,7,8-HxCDF	3		0%			1.68E-06
2,3,4,7,8-PeCDF	3		0%			1.90E-06
2,3,7,8-TCDD	3		0%			2.60E-06
2,3,7,8-TCDF	3		0%			1.97E-06
Total HpCDD	3	2	67%	1.27E-04	1.28E-04	9.13E-05
Total HpCDF	3	2	67%	1.82E-04	6.00E-04	2.83E-04
Total HxCDD	3	1	33%	9.02E-05	9.02E-05	3.37E-05
Total HxCDF	3	2	67%	2.49E-05	5.81E-04	2.04E-04
Total PeCDD	3		0%			3.13E-06
Total PeCDF	3		0%			1.85E-06
Total TCDD	3		0%			2.60E-06
Total TCDF	3		0%			1.97E-06

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-1.5

Borrow Pit Lake Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/l						
2,4,5-T	3		0%			0.25
2,4,5-TP (Silvex)	3		0%			0.25
2,4-D	3		0%			0.25
2,4-DB	3		0%			0.25
Dalapon	3		0%			60
Dicamba	3		0%			0.60
Dichloroprop	3		0%			3.0
Dinoseb	3		0%			3.0
MCPA	3		0%			60
MCPP	3		0%			60
Pentachlorophenol	3		0%			0.50
Metals, mg/l						
Aluminum	3	3	100%	0.65	3.4	1.6
Antimony	3		0%			0.010
Arsenic	3	3	100%	0.0079	0.015	0.012
Barium	3	3	100%	0.045	0.32	0.16
Beryllium	3		0%			0.0020
Cadmium	3		0%			0.0025
Calcium	3	3	100%	47	89	64
Chromium	3	1	33%	0.0041	0.0041	0.0047
Cobalt	3	1	33%	0.0015	0.0015	0.0038
Copper	3	3	100%	0.0036	0.0074	0.0053
Cyanide, Total	3		0%			0.0050
Iron	3	3	100%	1.3	8.7	3.9
Lead	3	3	100%	0.002	0.02	0.0083
Magnesium	3	3	100%	26	31	29
Manganese	3	3	100%	0.13	1.7	0.67
Mercury	3		0%			0.00010
Molybdenum	3	2	67%	0.0035	0.004	0.0042
Nickel	3	3	100%	0.0077	0.015	0.012
Potassium	3	3	100%	5.1	7.6	6.6
Selenium	3		0%			0.0050
Silver	3		0%			0.0050
Sodium	3	3	100%	21	24	22
Thallium	3		0%			0.0050
Vanadium	3	3	100%	0.0051	0.014	0.010
Zinc	3	3	100%	0.017	0.048	0.031
Fluoride (mg/l)	3	3	100%	0.25	0.29	0.26
Hardness as CaCO3 (mg/l)	3	3	100%	220	350	280
Ortho-Phosphate-P (mg/l)	3	3	100%	0.2	0.83	0.42
pH	3	3	100%	8.5	9.7	9.1
Suspended Solids (mg/l)	3	3	100%	37	160	84
Total Dissolved Solids (mg/l)	3	3	100%	280	480	370
Total Phosphorus (mg/l)	3	3	100%	0.26	1.2	0.59
PCBs, ug/l						
Decachlorobiphenyl	3		0%			0.25
Dichlorobiphenyl	3		0%			0.050
Heptachlorobiphenyl	3		0%			0.15
Hexachlorobiphenyl	3		0%			0.10
Monochlorobiphenyl	3		0%			0.050
Nonachlorobiphenyl	3		0%			0.25
Octachlorobiphenyl	3		0%			0.15
Pentachlorobiphenyl	3		0%			0.10
Tetrachlorobiphenyl	3		0%			0.10
Trichlorobiphenyl	3		0%			0.050
Total PCBs	3		0%			0.050
Pesticides, ug/l						
4,4'-DDD	3		0%			0.050
4,4'-DDE	3		0%			0.050
4,4'-DDT	3		0%			0.050
Total DDT	3		0%			0.050

Appendix C-1.5

Borrow Pit Lake Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Aldrin	3		0%			0.025
Alpha Chlordane	3		0%			0.025
alpha-BHC	3	2	67%	0.00047	0.001	0.0070
beta-BHC	3	3	100%	0.0096	0.02	0.014
delta-BHC	3	2	67%	0.00013	0.0022	0.0028
Dieldrin	3	1	33%	0.001	0.001	0.034
Endosulfan I	3	2	67%	0.0015	0.0024	0.0096
Endosulfan II	3		0%			0.050
Endosulfan sulfate	3	1	33%	0.0032	0.0032	0.034
Endrin	3	1	33%	0.00095	0.00095	0.034
Endrin aldehyde	3	2	67%	0.0016	0.0032	0.018
Endrin ketone	3	1	33%	0.0027	0.0027	0.034
Gamma Chlordane	3		0%			0.025
gamma-BHC (Lindane)	3	2	67%	0.0024	0.0038	0.0052
Heptachlor	3	3	100%	0.0022	0.0029	0.0026
Heptachlor epoxide	3	2	67%	0.0009	0.00096	0.0090
Methoxychlor	3		0%			0.25
Toxaphene	3		0%			2.5
SVOCs, ug/l						
1,2,4-Trichlorobenzene	3		0%			5.0
1,2-Dichlorobenzene	3		0%			5.0
1,3-Dichlorobenzene	3		0%			5.0
1,4-Dichlorobenzene	3		0%			5.0
2,2'-Oxybis(1-	3		0%			5.0
2,4,5-Trichlorophenol	3		0%			5.0
2,4,6-Trichlorophenol	3		0%			1.1
2,4-Dichlorophenol	3		0%			5.0
2,4-Dinitrophenol	3		0%			7.0
2,4-Dinitrotoluene	3		0%			5.0
2,6-Dinitrotoluene	3		0%			5.0
2-Chloronaphthalene	3		0%			5.0
2-Chlorophenol	3		0%			5.0
2-Methylnaphthalene	3		0%			5.0
2-Methylphenol (o-cresol)	3		0%			5.0
2-Nitroaniline	3		0%			25
2-Nitrophenol	3		0%			5.0
3,3'-Dichlorobenzidine	3		0%			10
3-Methylphenol/4-	3		0%			5.0
3-Nitroaniline	3		0%			25
4,6-Dinitro-2-methylphenol	3		0%			6.5
4-Bromophenylphenyl ether	3		0%			0.50
4-Chloro-3-methylphenol	3		0%			5.0
4-Chloroaniline	3		0%			10
4-Chlorophenylphenyl ether	3		0%			5.0
4-Nitroaniline	3		0%			25
4-Nitrophenol	3		0%			25
Acenaphthene	3		0%			5.0
Acenaphthylene	3		0%			5.0
Anthracene	3		0%			5.0
Benzo(a)anthracene	3		0%			5.0
Benzo(a)pyrene	3		0%			5.0
Benzo(b)fluoranthene	3		0%			5.0
Benzo(g,h,i)perylene	3		0%			5.0
Benzo(k)fluoranthene	3		0%			5.0
bis(2-Chloroethoxy)methane	3		0%			5.0
bis(2-Chloroethyl)ether	3		0%			5.0
bis(2-Ethylhexyl)phthalate	3		0%			0.90
Butylbenzylphthalate	3		0%			5.0
Carbazole	3		0%			5.0

Borrow Pit Lake Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Chrysene	3		0%			5.0
Di-n-butylphthalate	3		0%			5.0
Di-n-octylphthalate	3		0%			5.0
Dibenzo(a,h)anthracene	3		0%			5.0
Dibenzofuran	3		0%			5.0
Diethylphthalate	3		0%			5.0
Dimethylphthalate	3		0%			5.0
Fluoranthene	3		0%			5.0
Fluorene	3		0%			0.50
Hexachlorobenzene	3		0%			5.0
Hexachlorobutadiene	3		0%			5.0
Hexachlorocyclopentadiene	3		0%			5.0
Hexachloroethane	3		0%			0.95
Indeno(1,2,3-cd)pyrene	3		0%			5.0
Isophorone	3		0%			5.0
N-Nitroso-di-n-propylamine	3		0%			5.0
N-Nitrosodiphenylamine	3		0%			2.5
Naphthalene	3		0%			5.0
Nitrobenzene	3		0%			1.8
Pentachlorophenol	3		0%			2.5
Phenanthrene	3		0%			5.0
Phenol	3		0%			5.0
Pyrene	3		0%			5.0
Total PAHs	3		0%			5.0
VOCs, ug/l						
1,1,1-Trichloroethane	3		0%			2.5
1,1,2,2-Tetrachloroethane	3		0%			2.5
1,1,2-Trichloroethane	3		0%			2.5
1,1-Dichloroethane	3		0%			2.5
1,1-Dichloroethene	3		0%			2.5
1,2-Dichloroethane	3		0%			2.5
1,2-Dichloropropane	3		0%			2.5
2-Butanone (MEK)	3		0%			13
2-Hexanone	3		0%			13
4-Methyl-2-pentanone	3		0%			13
Acetone	3	3	100%	13	18	15
Benzene	3		0%			0.6
Bromodichloromethane	3		0%			2.5
Bromoform	3		0%			2.5
Bromomethane (Methyl	3		0%			4.9
Carbon disulfide	3		0%			2.5
Carbon tetrachloride	3		0%			2.5
Chlorobenzene	3		0%			2.5
Chloroethane	3		0%			5.0
Chloroform	3		0%			2.5
Chloromethane	3		0%			5.0
cis-1,3-Dichloropropene	3		0%			0.50
Cis/Trans-1,2-	3		0%			2.5
Dibromochloromethane	3		0%			2.5
Ethylbenzene	3		0%			2.5
Methylene chloride	3		0%			2.4
Styrene	3		0%			2.5
Tetrachloroethene	3		0%			2.5
Toluene	3		0%			2.5
trans-1,3-Dichloropropene	3		0%			2.5
Trichloroethene	3		0%			1.4
Vinyl chloride	3		0%			5.0
Xylenes, Total	3		0%			2.5

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-1.6

Dioxin Surface Water Summary Statistics Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/l						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	7.51E-04	1.43E-03	9.91E-04
1,2,3,4,6,7,8,9-OCDF	3	2	67%	5.03E-05	7.10E-05	5.05E-05
1,2,3,4,6,7,8-HpCDD	3	2	67%	4.42E-05	5.69E-05	4.12E-05
1,2,3,4,6,7,8-HpCDF	3	3	100%	1.44E-05	2.17E-05	1.80E-05
1,2,3,4,7,8,9-HpCDF	3		0%			4.83E-06
1,2,3,4,7,8-HxCDD	3		0%			3.35E-06
1,2,3,4,7,8-HxCDF	3		0%			3.12E-06
1,2,3,6,7,8-HxCDD	3		0%			3.13E-06
1,2,3,6,7,8-HxCDF	3		0%			2.90E-06
1,2,3,7,8,9-HxCDD	3		0%			3.25E-06
1,2,3,7,8,9-HxCDF	3		0%			3.45E-06
1,2,3,7,8-PeCDD	3		0%			3.25E-06
1,2,3,7,8-PeCDF	3		0%			2.28E-06
2,3,4,6,7,8-HxCDF	3		0%			3.07E-06
2,3,4,7,8-PeCDF	3		0%			2.40E-06
2,3,7,8-TCDD	3		0%			3.32E-06
2,3,7,8-TCDF	3		0%			3.07E-06
Total HpCDD	3	2	67%	9.35E-05	1.22E-04	9.02E-05
Total HpCDF	3	3	100%	4.16E-05	5.51E-05	4.76E-05
Total HxCDD	3	1	33%	6.20E-06	6.20E-06	4.43E-06
Total HxCDF	3		0%			3.12E-06
Total PeCDD	3		0%			3.25E-06
Total PeCDF	3		0%			2.35E-06
Total TCDD	3		0%			3.32E-06
Total TCDF	3		0%			3.07E-06

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-1.7

Reference Area Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/l						
2,4,5-T	4		0%			0.25
2,4,5-TP (Silvex)	4		0%			0.25
2,4-D	4		0%			0.25
2,4-DB	4		0%			0.25
Dalapon	4		0%			60
Dicamba	4		0%			0.60
Dichloroprop	4		0%			3.00
Dinoseb	4		0%			3.00
MCPA	4		0%			60
MCPP	4		0%			60
Pentachlorophenol	4		0%			0.50
Metals, mg/l						
Aluminum	4	4	100%	9.4	19.5	13
Antimony	4		0%			0.01
Arsenic	4	4	100%	0.0093	0.017	0.01
Barium	4	4	100%	0.32	0.41	0.36
Beryllium	4	2	50%	0.00067	0.00083	0.001
Cadmium	4		0%			0.003
Calcium	4	4	100%	50	72	59
Chromium	4	4	100%	0.011	0.0225	0.02
Cobalt	4	4	100%	0.0047	0.0076	0.01
Copper	4	4	100%	0.0097	0.0185	0.01
Cyanide, Total	4		0%			0.01
Iron	4	4	100%	11	25.5	16
Lead	4	4	100%	0.02	0.032	0.03
Magnesium	4	4	100%	23	35	27
Manganese	4	4	100%	1.5	2.9	1.98
Mercury	4		0%			0.0001
Molybdenum	4	4	100%	0.0032	0.00655	0.01
Nickel	4	4	100%	0.013	0.0245	0.02
Potassium	4	4	100%	7	11	8.50
Selenium	4		0%			0.01
Silver	4		0%			0.01
Sodium	4	4	100%	16	23	19
Thallium	4		0%			0.01
Vanadium	4	4	100%	0.031	0.0525	0.04
Zinc	4	4	100%	0.042	0.13	0.08
Fluoride (mg/l)	4	4	100%	0.23	0.38	0.31
Hardness as CaCO3 (mg/l)	4	4	100%	220	330	256
Ortho-Phosphate-P (mg/l)	4	3	75%	0.089	0.215	0.12
pH	4	4	100%	7.3	8.1	7.83
Suspended Solids (mg/l)	4	4	100%	270	700	420
Total Dissolved Solids	4	4	100%	310	460	368
Total Phosphorus (mg/l)	4	4	100%	0.87	3	1.64
PCB, ug/l						
Decachlorobiphenyl	4		0%			0.25
Dichlorobiphenyl	4		0%			0.05
Heptachlorobiphenyl	4		0%			0.15
Hexachlorobiphenyl	4		0%			0.10
Monochlorobiphenyl	4		0%			0.05
Nonachlorobiphenyl	4		0%			0.25
Octachlorobiphenyl	4		0%			0.15
Pentachlorobiphenyl	4		0%			0.10
Tetrachlorobiphenyl	4		0%			0.10
Trichlorobiphenyl	4		0%			0.05
Pesticides, ug/l	4		0%			0.05
4,4'-DDE	4	1	25%	0.0015	0.0015	0.04
4,4'-DDT	4	1	25%	0.0057	0.0057	0.04

Reference Area Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Aldrin	4	2	50%	0.0024	0.004	0.01
Alpha Chlordane	4	2	50%	0.0019	0.013	0.02
alpha-BHC	4	1	25%	0.00155	0.00155	0.02
beta-BHC	4	4	100%	0.0048	0.015	0.01
delta-BHC	4	1	25%	0.007	0.007	0.01
Dieldrin	4	2	50%	0.0021	0.0036	0.03
Endosulfan I	4	4	100%	0.0017	0.026	0.01
Endosulfan II	4	1	25%	9.6E-05	0.000096	0.04
Endosulfan sulfate	4	3	75%	0.0028	0.007	0.02
Endrin	4	2	50%	0.00048	0.0054	0.03
Endrin aldehyde	4	1	25%	0.05115	0.05115	0.05
Endrin ketone	4	2	50%	0.0047	0.011	0.03
Gamma Chlordane	4	2	50%	0.00082	0.0031	0.01
gamma-BHC (Lindane)	4	4	100%	0.001	0.01155	0.01
Heptachlor	4	1	25%	0.0035	0.0035	0.02
Heptachlor epoxide	4	4	100%	0.0047	0.0082	0.01
Methoxychlor	4		0%			0.25
Toxaphene	4		0%			2.50
SVOCs, ug/l						
1,2,4-Trichlorobenzene	4		0%			5.00
1,2-Dichlorobenzene	4		0%			5.00
1,3-Dichlorobenzene	4		0%			5.00
1,4-Dichlorobenzene	4		0%			5.00
2,2'-Oxybis(1-	4		0%			5.00
2,4,5-Trichlorophenol	4		0%			5.00
2,4,6-Trichlorophenol	4		0%			1.05
2,4-Dichlorophenol	4		0%			5.00
2,4-Dinitrophenol	4		0%			7.00
2,4-Dinitrotoluene	4		0%			5.00
2,6-Dinitrotoluene	4		0%			5.00
2-Chloronaphthalene	4		0%			5.00
2-Chlorophenol	4		0%			5.00
2-Methylnaphthalene	4		0%			5.00
2-Methylphenol (o-cresol)	4		0%			5.00
2-Nitroaniline	4		0%			25
2-Nitrophenol	4		0%			5.00
3,3'-Dichlorobenzidine	4		0%			10
3-Methylphenol/4-	4		0%			5.00
3-Nitroaniline	4		0%			25
4,6-Dinitro-2-methylphenol	4		0%			6.50
4-Bromophenylphenyl ether	4		0%			0.50
4-Chloro-3-methylphenol	4		0%			5.00
4-Chloroaniline	4		0%			10
4-Chlorophenylphenyl ether	4		0%			5.00
4-Nitroaniline	4		0%			25
4-Nitrophenol	4		0%			25
Acenaphthene	4		0%			5.00
Acenaphthylene	4		0%			5.00
Anthracene	4		0%			5.00
Benzo(a)anthracene	4		0%			5.00
Benzo(a)pyrene	4		0%			5.00
Benzo(b)fluoranthene	4		0%			5.00
Benzo(g,h,i)perylene	4		0%			5.00
Benzo(k)fluoranthene	4		0%			5.00
bis(2-	4		0%			5.00
bis(2-Chloroethyl)ether	4		0%			5.00
bis(2-Ethylhexyl)phthalate	4		0%			0.90
Butylbenzylphthalate	4		0%			5.00
Carbazole	4		0%			5.00
Chrysene	4		0%			5.00

Reference Area Surface Water Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Di-n-butylphthalate	4		0%			5.00
Di-n-octylphthalate	4		0%			5.00
Dibenzo(a,h)anthracene	4		0%			5.00
Dibenzofuran	4		0%			5.00
Diethylphthalate	4		0%			5.00
Dimethylphthalate	4		0%			5.00
Fluoranthene	4		0%			5.00
Fluorene	4		0%			0.50
Hexachlorobenzene	4		0%			5.00
Hexachlorobutadiene	4		0%			5.00
Hexachlorocyclopentadiene	4		0%			5.00
Hexachloroethane	4		0%			0.95
Indeno(1,2,3-cd)pyrene	4		0%			5.00
Isophorone	4		0%			5.00
N-Nitroso-di-n-propylamine	4		0%			5.00
N-Nitrosodiphenylamine	4		0%			2.50
Naphthalene	4		0%			5.00
Nitrobenzene	4		0%			1.75
Pentachlorophenol	4		0%			2.50
Phenanthrene	4		0%			5.00
Phenol	4		0%			5.00
Pyrene	4		0%			5.00
VOCs, ug/l						
1,1,1-Trichloroethane	4		0%			2.5
1,1,2,2-Tetrachloroethane	4		0%			2.5
1,1,2-Trichloroethane	4		0%			2.5
1,1-Dichloroethane	4		0%			2.5
1,1-Dichloroethene	4		0%			2.5
1,2-Dichloroethane	4		0%			2.5
1,2-Dichloropropane	4		0%			2.5
2-Butanone (MEK)	4		0%			12.5
2-Hexanone	4		0%			12.5
4-Methyl-2-pentanone	4		0%			12.5
Acetone	4	1	25%	38	38	28
Benzene	4		0%			0.6
Bromodichloromethane	4		0%			2.5
Bromoform	4		0%			2.5
Bromomethane (Methyl	4		0%			4.9
Carbon disulfide	4		0%			2.5
Carbon tetrachloride	4		0%			2.5
Chlorobenzene	4		0%			2.5
Chloroethane	4		0%			5
Chloroform	4		0%			2.5
Chloromethane	4		0%			5
cis-1,3-Dichloropropene	4		0%			0.5
Cis/Trans-1,2-	4		0%			2.5
Dibromochloromethane	4		0%			2.5
Ethylbenzene	4		0%			2.5
Methylene chloride	4		0%			2.35
Styrene	4		0%			2.5
Tetrachloroethene	4		0%			2.5
Toluene	4		0%			2.5
trans-1,3-Dichloropropene	4		0%			2.5
Trichloroethene	4		0%			1.35
Vinyl chloride	4		0%			5
Xylenes, Total	4		0%			2.5

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrat

Appendix C-1.8

Reference Area Surface Water Dioxin Data Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/l						
1,2,3,4,6,7,8,9-OCDD	4	4	100%	2.88E-03	7.40E-03	4.76E-03
1,2,3,4,6,7,8,9-OCDF	4	3	75%	1.23E-04	1.96E-04	1.19E-04
1,2,3,4,6,7,8-HpCDD	4	4	100%	9.59E-05	1.83E-04	1.43E-04
1,2,3,4,6,7,8-HpCDF	4	4	100%	1.47E-05	4.45E-05	3.02E-05
1,2,3,4,7,8,9-HpCDF	4	1	25%	1.19E-05	1.19E-05	5.93E-06
1,2,3,4,7,8-HxCDD	4	2	50%	5.75E-06	8.00E-06	4.63E-06
1,2,3,4,7,8-HxCDF	4		0%			3.20E-06
1,2,3,6,7,8-HxCDD	4	3	75%	9.00E-06	9.80E-06	7.51E-06
1,2,3,6,7,8-HxCDF	4	2	50%	5.30E-06	7.20E-06	4.04E-06
1,2,3,7,8,9-HxCDD	4	3	75%	1.09E-05	1.39E-05	1.00E-05
1,2,3,7,8,9-HxCDF	4	3	75%	7.50E-06	1.27E-05	7.95E-06
1,2,3,7,8-PeCDD	4	2	50%	8.30E-06	8.70E-06	5.32E-06
1,2,3,7,8-PeCDF	4	2	50%	6.80E-06	7.10E-06	4.79E-06
2,3,4,6,7,8-HxCDF	4		0%			3.38E-06
2,3,4,7,8-PeCDF	4	1	25%	5.90E-06	5.90E-06	3.29E-06
2,3,7,8-TCDD	4		0%			1.61E-06
2,3,7,8-TCDF	4	3	75%	5.40E-06	8.35E-06	5.70E-06
Total HpCDD	4	4	100%	2.02E-04	4.04E-04	3.27E-04
Total HpCDF	4	2	50%	8.10E-05	1.52E-04	7.80E-05
Total HxCDD	4	2	50%	6.33E-05	6.43E-05	4.35E-05
Total HxCDF	4	2	50%	2.16E-05	3.68E-05	2.86E-05
Total PeCDD	4	1	25%	8.30E-06	8.30E-06	5.34E-06
Total PeCDF	4	2	50%	1.30E-05	1.64E-05	9.20E-06
Total TCDD	4	3	75%	3.90E-06	1.70E-05	7.35E-06
Total TCDF	4	3	75%	5.40E-06	9.00E-06	5.86E-06

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Comparison of Surface Water Detection Limits to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Detection Limit	Illinois[1] Acute WQ Standards	Illinois[1] Chronic WQ Standards	NAWQ Criteria[2] CMC	NAWQ Criteria[2] CCC	Tier II Values[3] Secondary Acute Value	Tier II Values[3] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[4]	A COPC for this Medium?	Why is this a COC?	Comments on Detection Limits
Herbicides (ug/l)											
2,4,5-T	0.5								No		No criteria available to evaluate detection limit.
2,4,5-TP (Silvex)	0.5								No		No criteria available to evaluate detection limit.
2,4-D	0.5								No		No criteria available to evaluate detection limit.
2,4-DB	0.5								No		No criteria available to evaluate detection limit.
Dalapon	120								No		No criteria available to evaluate detection limit.
Dicamba	1.2								No		No criteria available to evaluate detection limit.
Dichloroprop	6								No		No criteria available to evaluate detection limit.
Dinoseb	6								No		No criteria available to evaluate detection limit.
MCPA	120								No		No criteria available to evaluate detection limit.
MCPP	120								No		No criteria available to evaluate detection limit.
Pentachlorophenol at pH 7.4	1			13	10				No		Detection limit less than criteria.
Metals/Inorganics (mg/l)											
Aluminum	All Detected			0.75[a]	0.087[a]				Yes	greater than criteria	Detected in all samples.
Antimony	0.02					0.18	0.03		No		Detection limit less than criteria.
Arsenic	0.01	0.36	0.19	0.34	0.15	0.066[b]	0.0031[b]		No		Detection limit greater than Tier II values in 1/6 samples.
Barium	All Detected					0.11	0.004		Yes	greater than Tier II	Detected in all samples.
Beryllium	**0.004**					0.035	0.00066		No		Detection limit greater than Tier II chronic value in 6/6 samples; source of uncertainty.
Cadmium	**0.005**	0.024	0.0021	0.011	0.0046				No		Detection limit greater than Illinois chronic standard and the NAWQ CCC in 6/6 samples; source of uncertainty.
Calcium	All Detected							116	No		Detected in all samples.
Chromium	0.01	3.3[c]/0.016[d]	0.39[c]/0.011[d]	3.4[c] / 0.016[d]	0.16[c]/ 0.011[d]				No		Detection limit less than criteria.
Cobalt	0.01					1.5	0.023		No		Detection limit less than criteria.
Copper	All Detected	0.037	0.023	0.029	0.018				No		Detected in all samples.
Cyanide, Total	**0.01**	0.022	0.0052	0.022	0.0052				No		Detection limit greater than chronic values in 6/6 samples; source of uncertainty.
Iron	All Detected				1				Yes	greater than criteria	Detected in all samples.
Lead	0.005	0.26	0.055	0.22	0.0087				Yes	greater than NAWQ criteria	Detection limit less than criteria.
Magnesium	All Detected							82	No		Detected in all samples.
Manganese	All Detected					2.3	0.12		Yes	greater than criteria	Detected in all samples.
Mercury	0.0002	0.0026	0.0013	0.0014	0.00077		0.0013		No		Detection limit less than criteria.
Molybdenum	0.01					16	0.37		No		Detection limit less than criteria.
Nickel	All Detected			0.91	0.1				No		Detected in all samples.
Potassium	All Detected							53	No		Detected in all samples.
Selenium	**0.01**				0.005				No		Detection limit greater than NAWQ CCC in 6/6 samples; source of uncertainty.
Silver	0.01			0.016			0.00036		No		Detection limit greater than Tier II chronic value in 6/6 samples.
Sodium	All Detected							680	No		Detected in all samples.
Thallium	0.01					0.11	0.012		No		Detection limit less than criteria.
Vanadium	0.01					0.28	0.02		No		Detection limit less than criteria.
Zinc	All Detected			0.23	0.23				No		Detected in all samples.
Fluoride (mg/l)	All Detected								No		No criteria available to evaluate detection limit - water quality parameter.
Hardness as CaCO3 (mg/l)	All Detected								No		No criteria available to evaluate detection limit - water quality parameter.
Ortho-Phosphate-P (mg/l)	All Detected								No		No criteria available to evaluate detection limit - water quality parameter.
pH	All Detected				6.5 - 9				No		Detected in all samples; water quality parameter.
Suspended Solids (mg/l)	5								No		No criteria available to evaluate detection limit - water quality parameter.
Total Dissolved Solids (mg/l)	All Detected								No		No criteria available to evaluate detection limit - water quality parameter.
Total Phosphorus (mg/l)	All Detected								No		No criteria available to evaluate detection limit - water quality parameter.

Comparison of Surface Water Detection Limits to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Detection Limit	Illinois[a] Acute WQ Standards	Illinois[a] Chronic WQ Standards	NAWQ Criteria[b] CMC	NAWQ Criteria[b] CCC	Tier II Values[c] Secondary Acute Value	Tier II Values[c] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[d]	A COPC for this Medium?	Why is this a COC?	Comments on Detection Limits
PCB (ug/l)					0.014[g]						
Decachlorobiphenyl	0.5								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty
Dichlorobiphenyl	0.1								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty
Heptachlorobiphenyl	0.3								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples; source of uncertainty
Hexachlorobiphenyl	0.2								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples; source of uncertainty
Monochlorobiphenyl	0.1								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty.
Nonachlorobiphenyl	0.5								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty
Octachlorobiphenyl	0.3								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty
Pentachlorobiphenyl	0.2								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty
Tetrachlorobiphenyl	0.2								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty
Trichlorobiphenyl	0.1								No		Detection limit greater than NAWQ CCC for PCBs in 6/6 samples, source of uncertainty
Pesticides (ug/l)											
4,4'-DDD	0.1					0.19	0.011		No		Detection limit greater than Tier II chronic value in 6/6 samples; source of uncertainty
4,4'-DDE	0.1								No		No criteria available to evaluate detection limit
4,4'-DDT	0.1			1.1	0.001		0.013[i]		No		Detection limit greater than CCC and Tier II chronic value in 6/6 samples, source of uncertainty
Aldrin	0.05			3					No		Detection limit less than criteria
Alpha Chlordane	0.05			2.4[e]	0.0043[e]				No		Detection limit greater than NAWQ CCC in 6/6 samples; source of uncertainty
alpha-BHC	0.039					39[h]	2.2[h]		No		Detection limit less than criteria
beta-BHC	0.014					39[h]	2.2[h]		No		Detection limit less than criteria.
delta-BHC	0.012					39[h]	2.2[h]		No		Detection limit less than criteria.
Dieldrin	0.1			0.24	0.056				No		Detection limit greater than NAWQ CCC in 5/6 samples; source of uncertainty.
Endosulfan I	0.05			0.22[f]	0.056[f]		0.51		No		Detection limit less than criteria.
Endosulfan II	0.1			0.22[f]	0.056[f]		0.51		No		Detection limit greater than NAWQ CCC in 6/6 samples; source of uncertainty.
Endosulfan sulfate	0.1								Yes	no criteria	No criteria available to evaluate detection limit.
Endrin	0.1			0.086	0.036				No		Detection limit greater than NAWQC in 6/6 samples; source of uncertainty.
Endrin aldehyde	0.1								Yes	no criteria	No criteria available to evaluate detection limit.
Endrin ketone	0.1								Yes	no criteria	No criteria available to evaluate detection limit.
Gamma Chlordane	0.05			2.4[e]	0.0043[e]				No		Detection limit greater than NAWQ CCC in 6/6 samples; source of uncertainty.
gamma-BHC (Lindane)	0.019			0.95					No		Detection limit less than criteria.
Heptachlor	0.05			0.52	0.0038	0.125	0.0069		No		Detection limit greater than CCC and Tier II chronic value in 3/6 samples; source of uncertainty.
Heptachlor epoxide	0.05			0.52	0.0038				No		Detection limit greater than NAWQ CCC in 4/6 samples; source of uncertainty.
Methoxychlor	0.5				0.03		0.019		No		Detection limit greater than CCC and Tier II chronic value in 6/6 samples; source of uncertainty.
Toxaphene	5			0.73	0.0002				No		Detection limit greater than NAWQC in 6/6 samples; source of uncertainty.

Comparison of Surface Water Detection Limits to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Detection Limit	Illinois[1] Acute WQ Standards	Illinois[1] Chronic WQ Standards	NAWQ Criteria[2] CMC	NAWQ Criteria[2] CCC	Tier II Values[3] Secondary Acute Value	Tier II Values[3] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[4]	A COPC for this Medium?	Why is this a COC?	Comments on Detection Limits
SVOC (ug/l)											
1,2,4-Trichlorobenzene	10					700	110		No		Detection limit less than criteria.
1,2-Dichlorobenzene	10					260	14		No		Detection limit less than criteria.
1,3-Dichlorobenzene	10					630	71		No		Detection limit less than criteria.
1,4-Dichlorobenzene	10					180	15		No		Detection limit less than criteria.
2,2'-Oxybis(1-Chloropropane)	10								No		No criteria available to evaluate detection limits.
2,4,5-Trichlorophenol	10								No		No criteria available to evaluate detection limits.
2,4,6-Trichlorophenol	2.1								No		No criteria available to evaluate detection limits.
2,4-Dichlorophenol	10								No		No criteria available to evaluate detection limits.
2,4-Dinitrophenol	14								No		No criteria available to evaluate detection limits.
2,4-Dinitrotoluene	10								No		No criteria available to evaluate detection limits.
2,6-Dinitrotoluene	10								No		No criteria available to evaluate detection limits.
2-Chloronaphthalene	10								No		No criteria available to evaluate detection limits.
2-Chlorophenol	10								No		No criteria available to evaluate detection limits.
2-Methylnaphthalene	10								No		No criteria available to evaluate detection limits.
2-Methylphenol (o-cresol)	10					230	13		No		Detection limit less than criteria.
2-Nitroaniline	50								No		No criteria available to evaluate detection limits.
2-Nitrophenol	10								No		No criteria available to evaluate detection limits.
3,3'-Dichlorobenzidine	20								No		No criteria available to evaluate detection limits.
3-Methylphenol/4-Methylphenol	10								No		No criteria available to evaluate detection limits.
3-Nitroaniline	50								No		No criteria available to evaluate detection limits.
4,6-Dinitro-2-methylphenol	13								No		No criteria available to evaluate detection limits.
4-Bromophenylphenyl ether	1						1.5		No		Detection limit less than criteria.
4-Chloro-3-methylphenol	10								No		No criteria available to evaluate detection limits.
4-Chloroaniline	20								No		No criteria available to evaluate detection limits.
4-Chlorophenylphenyl ether	10								No		No criteria available to evaluate detection limits.
4-Nitroaniline	50								No		No criteria available to evaluate detection limits.
4-Nitrophenol	50					1200	300		No		Detection limit less than criteria.
Acenaphthene	10							74	No		Detection limit less than criteria.
Acenaphthylene	10								No		No criteria available to evaluate detection limits.
Anthracene	**10**					13	0.73		No		Detection limit greater than Tier II chronic value in 6/6 samples; source of uncertainty.
Benzo(a)anthracene	**10**					0.49	0.027		No		Detection limit greater than Tier II values in 6/6 samples; source of uncertainty.
Benzo(a)pyrene	**10**					0.24	0.014		No		Detection limit greater than Tier II values in 6/6 samples; source of uncertainty.
Benzo(b)fluoranthene	10								No		No criteria available to evaluate detection limits.
Benzo(g,h,i)perylene	10								No		No criteria available to evaluate detection limits.
Benzo(k)fluoranthene	10								No		No criteria available to evaluate detection limits.
bis(2-Chloroethoxy)methane	10								No		No criteria available to evaluate detection limits.
bis(2-Chloroethyl)ether	10								No		No criteria available to evaluate detection limits.
bis(2-Ethylhexyl)phthalate	1.8					27	3		No		Detection limit less than criteria.
Butylbenzylphthalate	10						19		No		Detection limit less than criteria.
Carbazole	10								No		No criteria available to evaluate detection limits.
Chrysene	10								No		No criteria available to evaluate detection limits.
Di-n-butylphthalate	10					190	35		No		Detection limit less than criteria.
Di-n-octylphthalate	10							708	No		Detection limit less than criteria.
Dibenzo(a,h)anthracene	10								No		No criteria available to evaluate detection limits.
Dibenzofuran	**10**					66	3.7		No		Detection limit greater than Tier II chronic value in 6/6 samples; source of uncertainty.
Diethylphthalate	10					1800	210		No		Detection limit less than criteria.
Dimethylphthalate	10								No		No criteria available to evaluate detection limits.
Fluoranthene	10							15	No		Detection limit less than criteria.
Fluorene	1					70	3.9		No		Detection limit less than criteria.
Hexachlorobenzene	10								No		No criteria available to evaluate detection limits.
Hexachlorobutadiene	10								No		No criteria available to evaluate detection limits.
Hexachlorocyclopentadiene	10								No		No criteria available to evaluate detection limits.
Hexachloroethane	1.9					210	12		No		Detection limit less than criteria.
Indeno(1,2,3-cd)pyrene	10								No		No criteria available to evaluate detection limits.
Isophorone	10								No		No criteria available to evaluate detection limits.

Comparison of Surface Water Detection Limits to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Detection Limit	Illinois[1] Acute WQ Standards	Illinois[1] Chronic WQ Standards	NAWQ Criteria[2] CMC	NAWQ Criteria[2] CCC	Tier II Values[3] Secondary Acute Value	Tier II Values[3] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[4]	A COPC for this Medium?	Why is this a COC?	Comments on Detection Limits
N-Nitroso-di-n-propylamine	10								No		No criteria available to evaluate detection limits
N-Nitrosodiphenylamine	5					3800	210		No		Detection limit less than criteria
Naphthalene	10					190	12		No		Detection limit less than criteria
Nitrobenzene	3.5								No		No criteria available to evaluate detection limits
Pentachlorophenol	5								No		No criteria available to evaluate detection limits
Phenanthrene	10							200	No		Detection limit less than criteria.
Phenol	10							<200	No		Detection limit less than criteria.
Pyrene	10								No		No criteria available to evaluate detection limits
VOC (ug/l)											
1,1,1-Trichloroethane	5					200	11		No		Detection limit less than criteria
1,1,2,2-Tetrachloroethane	5					2100	610		No		Detection limit less than criteria
1,1,2-Trichloroethane	5					5200	1200		No		Detection limit less than criteria
1,1-Dichloroethane	5					830	47		No		Detection limit less than criteria
1,1-Dichloroethene	5					450	25		No		Detection limit less than criteria
1,2-Dichloroethane	5					8800	910		No		Detection limit less than criteria
1,2-Dichloropropane	5								No		No criteria available to evaluate detection limit
2-Butanone (MEK)	25					240000	14000		No		Detection limit less than criteria
2-Hexanone	25					1800	99		No		Detection limit less than criteria
4-Methyl-2-pentanone (MIBK)	25					2200	170		No		Detection limit less than criteria.
Acetone	50					28000	1500		No		Detection limit less than criteria
Benzene	1.2					2300	130		No		Detection limit less than criteria
Bromodichloromethane	5								No		No criteria available to evaluate detection limit
Bromoform	5								No		No criteria available to evaluate detection limit
Bromomethane (Methyl bromide)	9.8								No		No criteria available to evaluate detection limit
Carbon disulfide	5					17	0.92		No		Detection limit greater than Tier II chronic value in 6/6 samples; source of uncertainty
Carbon tetrachloride	5					180	9.8		No		Detection limit less than criteria
Chlorobenzene	5					1100	64		No		Detection limit less than criteria
Chloroethane	10								No		No criteria available to evaluate detection limit
Chloroform	5					490	28		No		Detection limit less than criteria
Chloromethane	10								No		No criteria available to evaluate detection limit.
cis-1,3-Dichloropropene	1					0.99[j]	0.055[j]		No		Detection limit greater than Tier II values in 6/6 samples; source of uncertainty.
Cis/Trans-1,2-Dichloroethene	5					1100	590		No		Detection limit less than criteria
Dibromochloromethane	5								No		No criteria available to evaluate detection limit.
Ethylbenzene	5					130	7.3		No		Detection limit less than criteria.
Methylene chloride (Dichloromethane)	4.7					26000	2200		No		Detection limit less than criteria.
Styrene	5								No		No criteria available to evaluate detection limit.
Tetrachloroethene	5					830	98		No		Detection limit less than criteria.
Toluene	5					120	9.8		No		Detection limit less than criteria.
trans-1,3-Dichloropropene	5					0.99[j]	0.055[j]		No		Detection limit greater than Tier II values in 6/6 samples; source of uncertainty.
Trichloroethene	2.7					440	47		No		Detection limit less than criteria.
Vinyl chloride	10								No		No criteria available to evaluate detection limit.
Xylenes, Total	5					230[h] / 32[j]	13[h] / 1.8[j]		No		Detection limit greater than Tier II chronic value in 6/6 samples; source of uncertainty.
Dioxins (ug/l)											
1,2,3,4,6,7,8,9-OCDD	All Detected								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,4,6,7,8,9-OCDF	All Detected								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,4,6,7,8-HpCDD	All Detected								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,4,6,7,8-HpCDF	All Detected								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,4,7,8,9-HpCDF	1.26E-05								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,4,7,8-HxCDD	8.80E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,4,7,8-HxCDF	8.30E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,6,7,8-HxCDD	8.20E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,6,7,8-HxCDF	7.70E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,7,8,9-HxCDD	8.50E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,7,8,9-HxCDF	9.20E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.

Comparison of Surface Water Detection Limits to Standards and Guidelines
Dead Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Detection Limit	Illinois[1] Acute WQ Standards	Illinois[1] Chronic WQ Standards	NAWQ Criteria[2] CMC	NAWQ Criteria[2] CCC	Tier II Values[3] Secondary Acute Value	Tier II Values[3] Secondary Chronic Value	Oak Ridge Lowest Chronic Value for All Organisms[4]	A COPC for this Medium?	Why is this a COC?	Comments on Detection Limits
1,2,3,7,8-PeCDD	8.70E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
1,2,3,7,8-PeCDF	6.00E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
2,3,4,6,7,8-HxCDF	8.20E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
2,3,4,7,8-PeCDF	6.30E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
2,3,7,8-TCDD	9.00E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
2,3,7,8-TCDF	8.80E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total HpCDD	All Detected								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total HpCDF	All Detected								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total HxCDD	8.50E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total HxCDF	8.30E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total PeCDD	8.70E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total PeCDF	6.20E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total TCDD	9.00E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total TCDF	8.80E-06								Yes	COPC in sediment	No criteria available to evaluate detection limit.
Total TEQ (mammal)	NA						3.1E-09		Yes	greater than Great Lakes Tier II	NA

Notes:
[a]Criterion is for total recoverable Aluminum at pH 6.5 - 9.0; USEPA says Water-Effects ratios may be more appropriate.
[b]Criterion is for Arsenic V
[c]Criterion is for Chromium III
[d]Criterion is for Chromium VI
[e]Criterion is for Chlordane
[f]Criterion is for alpha- and beta-Endosulfan
[g]Criterion is for PCBs
[h]Criterion is for BHC forms other than gamma-BHC
[i]Criterion is for DDT
[j]Criterion is for 1,3-Dichloropropene
[k]Criterion is for Xylene
[l]Criterion is for m-Xylene
[1] Illinois, 1999. Title 35 of the Illinois Administrative Code, Subtitle C, Chapter I, Part 302 Water Quality Standards, Subpart B.
[2] USEPA, 1999. National Recommended Water Quality Criteria - Correction, Office of Water, EPA 82-2-Z-99-001 (April 1999)
[3] Suter, G.W. II, and C.L. Tsao, 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effect on Aquatic Biota: 1996 Revision. Risk Assessment, Health Sciences Research Division, Oak Ridge, Tennessee, ES/ER/TM-96/R2.
Hardness dependent criteria calculated at a hardness of 220 mg/l as $CaCO_3$ (the lowest detected on site)
Bold indicates detection limit exceeds screening benchmark.
Results in ug/l for organic constituents; mg/l for inorganic constituents

SEDIMENT SUMMARY STATISTICS

Appendix C-2.1

Sediment Summary Statistics for Dead Creek Section F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	6		0%			38
2,4,5-TP (Silvex)	6		0%			38
2,4-D	6	3	50%	8.8	23	38
2,4-DB	6		0%			38
Dalapon	6		0%			304
Dicamba	6		0%			89
Dichloroprop	6		0%			452
Dinoseb	6		0%			452
MCPA	6		0%			8,942
MCPP	6		0%			8,942
Pentachlorophenol	6		0%			64
Inorganics, mg/kg						
Aluminum	6	6	100%	7,800	17,000	13,300
Antimony	6	5	83%	1.5	4.7	2.7
Arsenic	6	6	100%	8.0	19	15
Barium	6	6	100%	150	420	287
Beryllium	6	6	100%	0.53	0.89	0.74
Cadmium	6	6	100%	1.6	47	12
Calcium	6	6	100%	11,000	17,000	13,167
Chromium	6	6	100%	18	38	25
Cobalt	6	6	100%	5.5	13	9.4
Copper	6	6	100%	36	410	159
Cyanide, Total	6		0%			0.83
Iron	6	6	100%	14,000	38,000	27,333
Lead	6	6	100%	34	320	114
Magnesium	6	6	100%	3,600	6,800	5,033
Manganese	6	6	100%	170	1,400	758
Mercury	6	6	100%	0.10	1.1	0.37
Molybdenum	6	6	100%	0.37	3.7	1.2
Nickel	6	6	100%	35	390	134
Potassium	6	6	100%	1,500	2,900	2,183
Selenium	6		0%			1.6
Silver	6	1	17%	0.79	0.79	1.5
Sodium	6		0%			113
Thallium	6		0%			1.6
Vanadium	6	6	100%	25	51	37
Zinc	6	6	100%	250	3,700	1,197
pH	6	6	100%	6.7	7.06	6.9
Total Organic Carbon (mg/kg dry weight)	6	6	100%	33,000	140,000	64,333
PCBs, ug/kg						
Decachlorobiphenyl	6		0%			56
Dichlorobiphenyl	6		0%			11
Heptachlorobiphenyl	6		0%			33
Hexachlorobiphenyl	6	2	33%	17	22	25
Monochlorobiphenyl	6		0%			11
Nonachlorobiphenyl	6		0%			56
Octachlorobiphenyl	6		0%			33
Pentachlorobiphenyl	6	2	33%	61	66	39
Tetrachlorobiphenyl	6		0%			22
Trichlorobiphenyl	6		0%			11
Total PCBs	*6*	2	33%	*83*	*83*	57
Pesticides, ug/kg						
4,4'-DDD	6	1	17%	3.8	3.8	9.8
4,4'-DDE	6	6	100%	1.1	11	4.6
4,4'-DDT	6	3	50%	1.1	4.5	7.7
Total DDT	6	6	100%	2.2	43	18
Aldrin	6	1	17%	4.1	4.1	5.4
Alpha Chlordane	6	6	100%	0.48	5.3	2.6

Appendix C-2.1

Sediment Summary Statistics for Dead Creek Section F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
alpha-BHC	6		0%			1.6
beta-BHC	6		0%			1.6
delta-BHC	6	1	17%	0.34	0.34	1.5
Dieldrin	6	4	67%	0.26	9.3	6.3
Endosulfan I	6	6	100%	1.0	5.7	2.9
Endosulfan II	6	3	50%	1.8	8.1	6.8
Endosulfan sulfate	6	3	50%	1.4	9.5	8.7
Endrin	6	2	33%	1.7	1.7	7.7
Endrin aldehyde	6	6	100%	1.2	14	5.2
Endrin ketone	6	4	67%	0.7	10	6.7
Gamma Chlordane	6	5	83%	0.74	17	5.9
gamma-BHC (Lindane)	6	1	17%	4.8	4.8	5.6
Heptachlor	6	1	17%	0.93	0.93	4.5
Heptachlor epoxide	6	3	50%	0.51	5.4	4.9
Methoxychlor	6	3	50%	7.3	24	30
Toxaphene	6		0%			535
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	6		0%			279
1,2-Dichlorobenzene	6		0%			279
1,3-Dichlorobenzene	6		0%			279
1,4-Dichlorobenzene	6		0%			279
2,2'-Oxybis(1-Chloropropane)	6		0%			279
2,4,5-Trichlorophenol	6		0%			279
2,4,6-Trichlorophenol	6		0%			279
2,4-Dichlorophenol	6		0%			279
2,4-Dinitrophenol	6		0%			1,400
2,4-Dinitrotoluene	6		0%			279
2,6-Dinitrotoluene	6		0%			279
2-Chloronaphthalene	6		0%			279
2-Chlorophenol	6		0%			279
2-Methylnaphthalene	6		0%			279
2-Methylphenol (o-cresol)	6		0%			279
2-Nitroaniline	6		0%			1,400
2-Nitrophenol	6		0%			279
3,3'-Dichlorobenzidine	6		0%			538
3-Methylphenol/4-Methylphenol	6		0%			279
3-Nitroaniline	6		0%			1,400
4,6-Dinitro-2-methylphenol	6		0%			1,400
4-Bromophenylphenyl ether	6		0%			279
4-Chloro-3-methylphenol	6		0%			279
4-Chloroaniline	6		0%			538
4-Chlorophenylphenyl ether	6		0%			279
4-Nitroaniline	6		0%			1,400
4-Nitrophenol	6		0%			1,400
Acenaphthene	6		0%			279
Acenaphthylene	6		0%			279
Anthracene	6		0%			279
Benzo(a)anthracene	6		0%			279
Benzo(a)pyrene	6		0%			148
Benzo(b)fluoranthene	6		0%			279
Benzo(g,h,i)perylene	6		0%			279
Benzo(k)fluoranthene	6		0%			279
bis(2-Chloroethoxy)methane	6		0%			279
bis(2-Chloroethyl)ether	6		0%			279
bis(2-Ethylhexyl)phthalate	6		0%			279
Butylbenzylphthalate	6		0%			279
Carbazole	6		0%			279
Chrysene	6	1	17%	74	74	258
Di-n-butylphthalate	6		0%			279

Sediment Summary Statistics for Dead Creek Section F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Di-n-octylphthalate	6		0%			279
Dibenzo(a,h)anthracene	6		0%			148
Dibenzofuran	6		0%			279
Diethylphthalate	6		0%			279
Dimethylphthalate	6		0%			279
Fluoranthene	6	2	33%	120	130	236
Fluorene	6		0%			279
Hexachlorobenzene	6		0%			114
Hexachlorobutadiene	6		0%			279
Hexachlorocyclopentadiene	6		0%			279
Hexachloroethane	6		0%			279
Indeno(1,2,3-cd)pyrene	6		0%			279
Isophorone	6		0%			279
N-Nitroso-di-n-propylamine	6		0%			279
N-Nitrosodiphenylamine	6		0%			279
Naphthalene	6		0%			279
Nitrobenzene	6		0%			279
Pentachlorophenol	6		0%			1,400
Phenanthrene	6		0%			279
Phenol	6		0%			279
Pyrene	6		0%			279
Total PAHs	6	2	33%	194	440	300
VOCs, ug/kg						
1,1,1-Trichloroethane	6		0%			14
1,1,2,2-Tetrachloroethane	6		0%			14
1,1,2-Trichloroethane	6		0%			14
1,1-Dichloroethane	6		0%			14
1,1-Dichloroethene	6		0%			13
1,2-Dichloroethane	6		0%			14
1,2-Dichloropropane	6		0%			14
2-Butanone (MEK)	6		0%			67
2-Hexanone	6		0%			67
4-Methyl-2-pentanone (MIBK)	6		0%			67
Acetone	6		0%			138
Benzene	6		0%			14
Bromodichloromethane	6		0%			14
Bromoform	6		0%			14
Bromomethane (Methyl bromide)	6		0%			27
Carbon disulfide	6		0%			14
Carbon tetrachloride	6		0%			14
Chlorobenzene	6		0%			14
Chloroethane	6		0%			27
Chloroform	6		0%			14
Chloromethane	6		0%			27
cis-1,3-Dichloropropene	6		0%			11
Cis/Trans-1,2-Dichloroethene	6		0%			14
Dibromochloromethane	6		0%			14
Ethylbenzene	6	1	17%	11	11	13
Methylene chloride (Dichloromethane)	6		0%			14
Styrene	6		0%			14
Tetrachloroethene	6		0%			14
Toluene	6		0%			14
trans-1,3-Dichloropropene	6		0%			11
Trichloroethene	6		0%			14
Vinyl chloride	6		0%			27
Xylenes, Total	6		0%			14

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.2

Site Sediment Dioxin Summary Statistics Creek Sector F and Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	6	6	100%	8.63E+00	8.84E+01	3.60E+01
1,2,3,4,6,7,8,9-OCDF	6	6	100%	2.35E-01	3.26E+01	1.14E+01
1,2,3,4,6,7,8-HpCDD	6	6	100%	2.38E-01	9.44E+00	3.17E+00
1,2,3,4,6,7,8-HpCDF	6	6	100%	5.48E-02	5.08E+00	1.78E+00
1,2,3,4,7,8,9-HpCDF	6	6	100%	6.00E-03	3.20E-01	1.17E-01
1,2,3,4,7,8-HxCDD	6	5	83%	2.40E-03	6.88E-02	2.17E-02
1,2,3,4,7,8-HxCDF	6	6	100%	5.05E-03	1.62E-01	5.92E-02
1,2,3,6,7,8-HxCDD	6	6	100%	7.95E-03	3.20E-01	1.10E-01
1,2,3,6,7,8-HxCDF	6	6	100%	2.95E-03	7.19E-02	2.57E-02
1,2,3,7,8,9-HxCDD	6	6	100%	9.75E-03	2.21E-01	6.98E-02
1,2,3,7,8,9-HxCDF	6	6	100%	7.40E-04	2.23E-02	8.21E-03
1,2,3,7,8-PeCDD	6	6	100%	2.10E-03	3.89E-02	1.41E-02
1,2,3,7,8-PeCDF	6	4	67%	1.50E-03	1.24E-02	7.66E-03
2,3,4,6,7,8-HxCDF	6	6	100%	3.50E-03	8.99E-02	3.41E-02
2,3,4,7,8-PeCDF	6	6	100%	2.90E-03	3.33E-02	1.28E-02
2,3,7,8-TCDD	6	6	100%	9.00E-04	1.60E-02	7.58E-03
2,3,7,8-TCDF	6	6	100%	6.20E-03	4.48E-02	1.95E-02
Total HpCDD	6	6	100%	5.41E-01	1.79E+01	6.11E+00
Total HpCDF	6	5	83%	1.83E-01	2.17E+01	7.50E+00
Total HxCDD	6	1	17%	1.37E+00	1.37E+00	5.92E-01
Total HxCDF	6		0%			5.28E-01
Total PeCDD	6		0%			1.42E-01
Total PeCDF	6		0%			1.20E-01
Total TCDD	6		0%			1.16E-01
Total TCDF	6		0%			1.79E-01

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.3

Sediment Summary Statistics for Dead Creek Sector F
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			63
2,4,5-TP (Silvex)	3		0%			63
2,4-D	3	1	33%	23	23	66
2,4-DB	3		0%			63
Dalapon	3		0%			517
Dicamba	3		0%			151
Dichloroprop	3		0%			762
Dinoseb	3		0%			762
MCPA	3		0%			15067
MCPP	3		0%			15067
Pentachlorophenol	3		0%			104
Metals, mg/kg						
Aluminum	3	3	100%	7800	17000	12933
Antimony	2	2	100%	2.5	2.6	2.55
Arsenic	3	3	100%	8	19	14
Barium	3	3	100%	150	270	223
Beryllium	3	3	100%	0.53	0.89	0.76
Cadmium	3	3	100%	7.4	47	23
Calcium	3	3	100%	11000	13000	11667
Chromium	3	3	100%	19	38	29
Cobalt	3	3	100%	5.5	13	9.83
Copper	3	3	100%	160	410	270
Cyanide, Total	3		0%			0.95
Iron	3	3	100%	14000	26000	20667
Lead	3	3	100%	110	320	180
Magnesium	3	3	100%	4100	6800	5400
Manganese	3	3	100%	170	510	303
Mercury	3	3	100%	0.3	1.1	0.62
Molybdenum	3	3	100%	0.7	3.7	1.72
Nickel	3	3	100%	90	390	220
Potassium	3	3	100%	1600	2900	2400
Selenium	3		0%			1.80
Silver	3		0%			1.80
Sodium	3		0%			132
Thallium	3		0%			1.80
Vanadium	3	3	100%	25	51	39
Zinc	3	3	100%	950	3700	2083
pH	3	3	100%	6.71	6.87	6.81
Total Organic Carbon	3	3	100%	40000	140000	80333
PCB, ug/kg						
Decachlorobiphenyl	3		0%			73
Dichlorobiphenyl	3		0%			14
Heptachlorobiphenyl	3		0%			43
Hexachlorobiphenyl	3	2	67%	17	22	33
Monochlorobiphenyl	3		0%			14
Nonachlorobiphenyl	3		0%			73
Octachlorobiphenyl	3		0%			43
Pentachlorobiphenyl	3	2	67%	61	66	62
Tetrachlorobiphenyl	3		0%			29
Trichlorobiphenyl	3		0%			14
Total PCBs	3	2	67%	83	120	75
Pesticides, ug/kg						
4,4'-DDD	3	1	33%	3.8	3.8	11
4,4'-DDE	3	3	100%	2.5	11	7.20
4,4'-DDT	3	1	33%	4.5	4.5	11
Total DDT	3	3	100%	19	43	30
Aldrin	3	1	33%	4.1	4.1	6.37
Alpha Chlordane	3	3	100%	0.84	5.3	3.58

Appendix C-2.3

Sediment Summary Statistics for Dead Creek Sector F
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
alpha-BHC	3		0%			1.88
beta-BHC	3		0%			1.88
delta-BHC	3	1	33%	0.34	0.34	1.61
Dieldrin	3	2	67%	0.99	9.3	9.26
Endosulfan I	3	3	100%	1.2	5.7	2.97
Endosulfan II	3	3	100%	1.8	8.1	5.13
Endosulfan sulfate	3	1	33%	2.8	2.8	11
Endrin	3	2	67%	1.7	1.7	6.97
Endrin aldehyde	3	3	100%	3.6	14	8.87
Endrin ketone	3	3	100%	3.8	10	7.00
Gamma Chlordane	3	3	100%	2.4	17	8.97
gamma-BHC (Lindane)	3		0%			6.30
Heptachlor	3	1	33%	0.93	0.93	4.61
Heptachlor epoxide	3	2	67%	0.51	5.4	4.97
Methoxychlor	3	3	100%	7.3	24	15
Toxaphene	3		0%			630
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			318
1,2-Dichlorobenzene	3		0%			318
1,3-Dichlorobenzene	3		0%			318
1,4-Dichlorobenzene	3		0%			318
2,2'-Oxybis(1-Chloropropane)	3		0%			318
2,4,5-Trichlorophenol	3		0%			318
2,4,6-Trichlorophenol	3		0%			318
2,4-Dichlorophenol	3		0%			318
2,4-Dinitrophenol	3		0%			1600
2,4-Dinitrotoluene	3		0%			318
2,6-Dinitrotoluene	3		0%			318
2-Chloronaphthalene	3		0%			318
2-Chlorophenol	3		0%			318
2-Methylnaphthalene	3		0%			318
2-Methylphenol (o-cresol)	3		0%			318
2-Nitroaniline	3		0%			1600
2-Nitrophenol	3		0%			318
3,3'-Dichlorobenzidine	3		0%			612
3-Methylphenol/4-Methylphenol	3		0%			318
3-Nitroaniline	3		0%			1600
4,6-Dinitro-2-methylphenol	3		0%			1600
4-Bromophenylphenyl ether	3		0%			318
4-Chloro-3-methylphenol	3		0%			318
4-Chloroaniline	3		0%			612
4-Chlorophenylphenyl ether	3		0%			318
4-Nitroaniline	3		0%			1600
4-Nitrophenol	3		0%			1600
Acenaphthene	3		0%			318
Acenaphthylene	3		0%			318
Anthracene	3		0%			318
Benzo(a)anthracene	3		0%			318
Benzo(a)pyrene	3		0%			168
Benzo(b)fluoranthene	3		0%			318
Benzo(g,h,i)perylene	3		0%			318
Benzo(k)fluoranthene	3		0%			318
bis(2-Chloroethoxy)methane	3		0%			318
bis(2-Chloroethyl)ether	3		0%			318
bis(2-Ethylhexyl)phthalate	3		0%			318
Butylbenzylphthalate	3		0%			318
Carbazole	3		0%			318
Chrysene	3	1	33%	74	74	276
Di-n-butylphthalate	3		0%			318
Di-n-octylphthalate	3		0%			318
Dibenzo(a,h)anthracene	3		0%			168

Sediment Summary Statistics for Dead Creek Sector F
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dibenzofuran	3		0%			318
Diethylphthalate	3		0%			318
Dimethylphthalate	3		0%			318
Fluoranthene	3	2	67%	120	130	232
Fluorene	3		0%			318
Hexachlorobenzene	3		0%			132
Hexachlorobutadiene	3		0%			318
Hexachlorocyclopentadiene	3		0%			318
Hexachloroethane	3		0%			318
Indeno(1,2,3-cd)pyrene	3		0%			318
Isophorone	3		0%			318
N-Nitroso-di-*n*-propylamine	3		0%			318
N-Nitrosodiphenylamine	3		0%			318
Naphthalene	3		0%			318
Nitrobenzene	3		0%			318
Pentachlorophenol	3		0%			1600
Phenanthrene	3		0%			318
Phenol	3		0%			318
Pyrene	3		0%			318
Total PAHs	3	2	67%	194	440	360
VOCs, ug/kg						
1,1,1-Trichloroethane	3		0%			14
1,1,2,2-Tetrachloroethane	3		0%			14
1,1,2-Trichloroethane	3		0%			14
1,1-Dichloroethane	3		0%			14
1,1-Dichloroethene	3		0%			13
1,2-Dichloroethane	3		0%			14
1,2-Dichloropropane	3		0%			14
2-Butanone (MEK)	3		0%			69
2-Hexanone	3		0%			69
4-Methyl-2-pentanone (MIBK)	3		0%			69
Acetone	3		0%			145
Benzene	3		0%			14
Bromodichloromethane	3		0%			14
Bromoform	3		0%			14
Bromomethane (Methyl bromide)	3		0%			28
Carbon disulfide	3		0%			14
Carbon tetrachloride	3		0%			14
Chlorobenzene	3		0%			14
Chloroethane	3		0%			28
Chloroform	3		0%			14
Chloromethane	3		0%			28
cis-1,3-Dichloropropene	3		0%			11
Cis/Trans-1,2-Dichloroethene	3		0%			14
Dibromochloromethane	3		0%			14
Ethylbenzene	3	1	33%	11	11	13
Methylene chloride (Dichloromethane)	3		0%			14
Styrene	3		0%			14
Tetrachloroethene	3		0%			14
Toluene	3		0%			14
trans-1,3-Dichloropropene	3		0%			11
Trichloroethene	3		0%			14
Vinyl chloride	3		0%			28
Xylenes, Total	3		0%			14

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.4

Sediment Dioxin Data Summary for Dead Creek Sector F
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	3.87E+01	8.84E+01	5.82E+01
1,2,3,4,6,7,8,9-OCDF	3	3	100%	1.50E+01	3.26E+01	2.23E+01
1,2,3,4,6,7,8-HpCDD	3	3	100%	4.03E+00	9.44E+00	5.97E+00
1,2,3,4,6,7,8-HpCDF	3	3	100%	2.38E+00	5.08E+00	3.45E+00
1,2,3,4,7,8,9-HpCDF	3	3	100%	1.57E-01	3.20E-01	2.25E-01
1,2,3,4,7,8-HxCDD	3	3	100%	2.28E-02	6.88E-02	4.02E-02
1,2,3,4,7,8-HxCDF	3	3	100%	8.42E-02	1.62E-01	1.11E-01
1,2,3,6,7,8-HxCDD	3	3	100%	1.41E-01	3.20E-01	2.07E-01
1,2,3,6,7,8-HxCDF	3	3	100%	3.25E-02	7.19E-02	4.70E-02
1,2,3,7,8,9-HxCDD	3	3	100%	6.67E-02	2.21E-01	1.26E-01
1,2,3,7,8,9-HxCDF	3	3	100%	8.50E-03	2.23E-02	1.39E-02
1,2,3,7,8-PeCDD	3	3	100%	1.45E-02	3.89E-02	2.55E-02
1,2,3,7,8-PeCDF	3	2	67%	1.18E-02	1.24E-02	1.36E-02
2,3,4,6,7,8-HxCDF	3	3	100%	4.73E-02	8.99E-02	6.25E-02
2,3,4,7,8-PeCDF	3	3	100%	1.47E-02	3.33E-02	2.20E-02
2,3,7,8-TCDD	3	3	100%	5.50E-03	1.60E-02	9.93E-03
2,3,7,8-TCDF	3	3	100%	1.60E-02	4.48E-02	3.04E-02
Total HpCDD	3	3	100%	7.86E+00	1.79E+01	1.14E+01
Total HpCDF	3	3	100%	1.07E+01	2.17E+01	1.46E+01
Total HxCDD	3	1	33%	1.37E+00	1.37E+00	1.11E+00
Total HxCDF	3		0%			1.01E+00
Total PeCDD	3		0%			2.60E-01
Total PeCDF	3		0%			2.21E-01
Total TCDD	3		0%			2.08E-01
Total TCDF	3		0%			3.17E-01

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.5

Sediment Data Summary for Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			12
2,4,5-TP (Silvex)	3		0%			12
2,4-D	3	2	67%	8.8	11	11
2,4-DB	3		0%			12
Dalapon	3		0%			92
Dicamba	3		0%			28
Dichloroprop	3		0%			142
Dinoseb	3		0%			142
MCPA	3		0%			2,817
MCPP	3		0%			2,817
Pentachlorophenol	3		0%			24
Metals, mg/kg						
Aluminum	3	3	100%	11,000	16,000	13,667
Antimony	3	2	67%	1.5	2.2	2.2
Arsenic	3	3	100%	13	17	16
Barium	3	3	100%	240	420.00	350
Beryllium	3	3	100%	0.58	0.82	0.71
Cadmium	3	3	100%	1.6	2.7	2.1
Calcium	3	3	100%	11,000	17,000	14,667
Chromium	3	3	100%	18	26	22
Cobalt	3	3	100%	7.1	10	8.9
Copper	3	3	100%	36	64	49
Cyanide, Total	3		0%			0.72
Iron	3	3	100%	28,000	38,000	34,000
Lead	3	3	100%	34	58	48
Magnesium	3	3	100%	3,600	5,600	4,667
Manganese	3	3	100%	940	1,400	1,213
Mercury	3	3	100%	0.10	0.16	0.12
Molybdenum	3	3	100%	0.37	0.92	0.60
Nickel	3	3	100%	35	54	47
Potassium	3	3	100%	1,500	2,200	1,967
Selenium	3		0%			1.4
Silver	3	1	33%	0.79	0.79	1.1
Sodium	3		0%			93
Thallium	3		0%			1.4
Vanadium	3	3	100%	28	40	35
Zinc	3	3	100%	250	370	310
pH	3	3	100%	6.7	7.1	6.9
Total Organic Carbon (mg/kg dry weight)	3	3	100%	33,000	67,000	48,333
PCB, ug/kg						
Decachlorobiphenyl	3		0%			39
Dichlorobiphenyl	3		0%			7.8
Heptachlorobiphenyl	3		0%			24
Hexachlorobiphenyl	3		0%			16
Monochlorobiphenyl	3		0%			7.8
Nonachlorobiphenyl	3		0%			39
Octachlorobiphenyl	3		0%			24
Pentachlorobiphenyl	3		0%			16
Tetrachlorobiphenyl	3		0%			16
Trichlorobiphenyl	3		0%			7.8
Total PCBs	3		0%			39
Pesticides, ug/kg						
4,4'-DDD	3		0%			8.5
4,4'-DDE	3	3	100%	1.1	3.2	2.0
4,4'-DDT	3	2	67%	1.1	1.4	4.0
Total DDT	3	3	100%	2.2	12.7	6.0
Aldrin	3		0%			4.4
Alpha Chlordane	3	3	100%	0.48	3.2	1.6
alpha-BHC	3		0%			1.3
beta-BHC	3		0%			1.3

Sediment Data Summary for Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
delta-BHC	3		0%			1.3
Dieldrin	3	2	67%	0.26	0.50	3.3
Endosulfan I	3	3	100%	1.00	4.90	2.9
Endosulfan II	3		0%			8.5
Endosulfan sulfate	3	2	67%	1.4	9.5	6.6
Endrin	3		0%			8.5
Endrin aldehyde	3	3	100%	1.2	2.2	1.6
Endrin ketone	3	1	33%	0.72	0.72	6.4
Gamma Chlordane	3	2	67%	0.74	3.0	2.8
gamma-BHC (Lindane)	3	1	33%	4.8	4.8	4.8
Heptachlor	3		0%			4.4
Heptachlor epoxide	3	1	33%	4.8	4.8	4.8
Methoxychlor	3		0%			44
Toxaphene	3		0%			440
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			240
1,2-Dichlorobenzene	3		0%			240
1,3-Dichlorobenzene	3		0%			240
1,4-Dichlorobenzene	3		0%			240
2,2'-Oxybis(1-Chloropropane)	3		0%			240
2,4,5-Trichlorophenol	3		0%			240
2,4,6-Trichlorophenol	3		0%			240
2,4-Dichlorophenol	3		0%			240
2,4-Dinitrophenol	3		0%			1,200
2,4-Dinitrotoluene	3		0%			240
2,6-Dinitrotoluene	3		0%			240
2-Chloronaphthalene	3		0%			240
2-Chlorophenol	3		0%			240
2-Methylnaphthalene	3		0%			240
2-Methylphenol (o-cresol)	3		0%			240
2-Nitroaniline	3		0%			1,200
2-Nitrophenol	3		0%			240
3,3'-Dichlorobenzidine	3		0%			463
3-Methylphenol/4-Methylphenol	3		0%			240
3-Nitroaniline	3		0%			1,200
4,6-Dinitro-2-methylphenol	3		0%			1,200
4-Bromophenylphenyl ether	3		0%			240
4-Chloro-3-methylphenol	3		0%			240
4-Chloroaniline	3		0%			463
4-Chlorophenylphenyl ether	3		0%			240
4-Nitroaniline	3		0%			1,200
4-Nitrophenol	3		0%			1,200
Acenaphthene	3		0%			240
Acenaphthylene	3		0%			240
Anthracene	3		0%			240
Benzo(a)anthracene	3		0%			240
Benzo(a)pyrene	3		0%			127
Benzo(b)fluoranthene	3		0%			240
Benzo(g,h,i)perylene	3		0%			240
Benzo(k)fluoranthene	3		0%			240
bis(2-Chloroethoxy)methane	3		0%			240
bis(2-Chloroethyl)ether	3		0%			240
bis(2-Ethylhexyl)phthalate	3		0%			240
Butylbenzylphthalate	3		0%			240
Carbazole	3		0%			240
Chrysene	3		0%			240
Di-n-butylphthalate	3		0%			240
Di-n-octylphthalate	3		0%			240
Dibenzo(a,h)anthracene	3		0%			127
Dibenzofuran	3		0%			240
Diethylphthalate	3		0%			240

Appendix C-2.5

Sediment Data Summary for Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dimethylphthalate	3		0%			240
Fluoranthene	3		0%			240
Fluorene	3		0%			240
Hexachlorobenzene	*3*		*0%*			*97*
Hexachlorobutadiene	3		0%			240
Hexachlorocyclopentadiene	3		0%			240
Hexachloroethane	3		0%			240
Indeno(1,2,3-cd)pyrene	3		0%			240
Isophorone	3		0%			240
N-Nitroso-di-n-propylamine	3		0%			240
N-Nitrosodiphenylamine	3		0%			240
Naphthalene	3		0%			240
Nitrobenzene	3		0%			240
Pentachlorophenol	3		0%			1,200
Phenanthrene	3		0%			240
Phenol	3		0%			240
Pyrene	3		0%			240
Total PAHs	3		0%			240
VOCs, ug/kg						
1,1,1-Trichloroethane	3		0%			13
1,1,2,2-Tetrachloroethane	3		0%			13
1,1,2-Trichloroethane	3		0%			13
1,1-Dichloroethane	3		0%			13
1,1-Dichloroethene	3		0%			12
1,2-Dichloroethane	3		0%			13
1,2-Dichloropropane	3		0%			13
2-Butanone (MEK)	3		0%			65
2-Hexanone	3		0%			65
4-Methyl-2-pentanone (MIBK)	3		0%			65
Acetone	3		0%			130
Benzene	3		0%			13
Bromodichloromethane	3		0%			13
Bromoform	3		0%			13
Bromomethane (Methyl bromide)	3		0%			26
Carbon disulfide	3		0%			13
Carbon tetrachloride	3		0%			13
Chlorobenzene	3		0%			13
Chloroethane	*3*		*0%*			*26*
Chloroform	3		0%			13
Chloromethane	3		0%			26
cis-1,3-Dichloropropene	3		0%			10
Cis/Trans-1,2-Dichloroethene	3		0%			13
Dibromochloromethane	3		0%			13
Ethylbenzene	3		0%			13
Methylene chloride (Dichloromethane)	3		0%			13
Styrene	3		0%			13
Tetrachloroethene	3		0%			13
Toluene	3		0%			13
trans-1,3-Dichloropropene	3		0%			10
Trichloroethene	3		0%			13
Vinyl chloride	3		0%			26
Xylenes, Total	3		0%			13

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.6

Sediment Dioxin Summary for Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	8.63	17.25	13.79
1,2,3,4,6,7,8,9-OCDF	3	3	100%	0.24	0.76	0.55
1,2,3,4,6,7,8-HpCDD	3	3	100%	0.24	0.44	0.37
1,2,3,4,6,7,8-HpCDF	3	3	100%	0.05	0.16	0.11
1,2,3,4,7,8,9-HpCDF	3	3	100%	0.01	0.01	0.01
1,2,3,4,7,8-HxCDD	3	2	67%	0.0024	0.0049	0.0031
1,2,3,4,7,8-HxCDF	3	3	100%	0.01	0.0092	0.01
1,2,3,6,7,8-HxCDD	3	3	100%	0.01	0.02	0.01
1,2,3,6,7,8-HxCDF	3	3	100%	0.0030	0.0059	0.0043
1,2,3,7,8,9-HxCDD	3	3	100%	0.01	0.02	0.01
1,2,3,7,8,9-HxCDF	3	3	100%	0.00074	0.0036	0.0025
1,2,3,7,8-PeCDD	3	3	100%	0.0021	0.0035	0.0026
1,2,3,7,8-PeCDF	3	2	67%	0.0015	0.0027	0.0017
2,3,4,6,7,8-HxCDF	3	3	100%	0.0035	0.0073	0.01
2,3,4,7,8-PeCDF	3	3	100%	0.0029	0.0042	0.0037
2,3,7,8-TCDD	3	3	100%	0.00090	0.01	0.01
2,3,7,8-TCDF	3	3	100%	0.01	0.01	0.01
Total HpCDD	3	3	100%	0.54	0.93	0.80
Total HpCDF	3	2	67%	0.18	0.60	0.35
Total HxCDD	3		0%			0.07
Total HxCDF	3		0%			0.05
Total PeCDD	3		0%			0.02
Total PeCDF	3		0%			0.02
Total TCDD	3		0%			0.02
Total TCDF	3		0%			0.04

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.7

Reference Area Sediment Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	4		0%			9.00
2,4,5-TP (Silvex)	4		0%			9.00
2,4-D	4	1	25%	12	12	10
2,4-DB	4		0%			9.00
Dalapon	4		0%			69
Dicamba	4		0%			22
Dichloroprop	4		0%			110
Dinoseb	4		0%			110
MCPA	4		0%			2175
MCPP	4		0%			2175
Pentachlorophenol	4	1	25%	1.9	1.9	15
Metals, mg/kg						
Aluminum	4	4	100%	12000	19000	14500
Antimony	4	3	75%	1.3	4	2.10
Arsenic	4	4	100%	6.7	8	7.18
Barium	4	4	100%	170	230	208
Beryllium	4	4	100%	0.62	1	0.78
Cadmium	4	4	100%	0.29	0.65	0.42
Calcium	4	4	100%	12000	18000	13500
Chromium	4	4	100%	17	25	20
Cobalt	4	4	100%	7.1	10	8.60
Copper	4	4	100%	16	23	19
Cyanide, Total	4		0%			0.55
Iron	4	4	100%	18000	24000	20750
Lead	4	4	100%	17	26	22
Magnesium	4	4	100%	3300	6500	5150
Manganese	4	4	100%	570	770	708
Mercury	4	4	100%	0.04	0.063	0.05
Molybdenum	4	4	100%	0.37	0.53	0.45
Nickel	4	4	100%	18	26	22
Potassium	4	4	100%	1600	2600	2100
Selenium	4		0%			1.03
Silver	4		0%			1.03
Sodium	4		0%			85
Thallium	4		0%			1.03
Vanadium	4	4	100%	30	44	35
Zinc	4	4	100%	59	96	83
pH	4	4	100%	6.8	7.31	7.07
Total Organic Carbon	4	4	100%	12000	23000	17000
PCB, ug/kg						
Decachlorobiphenyl	4		0%			18
Dichlorobiphenyl	4		0%			3.60
Heptachlorobiphenyl	4		0%			11
Hexachlorobiphenyl	4		0%			7.25
Monochlorobiphenyl	4		0%			3.60
Nonachlorobiphenyl	4		0%			18.3
Octachlorobiphenyl	4		0%			11
Pentachlorobiphenyl	4		0%			7.25
Tetrachlorobiphenyl	4		0%			7.25
Trichlorobiphenyl	4		0%			3.60
Total PCBs	4		0%			18.3
Pesticides, ug/kg						
4,4'-DDD	4		0%			3.58
4,4'-DDE	4		0%			3.58
4,4'-DDT	4		0%			3.58
Aldrin	4		0%			1.85
Alpha Chlordane	4		0%			1.85
alpha-BHC	4		0%			0.54
beta-BHC	4		0%			0.54

Reference Area Sediment Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
delta-BHC	4		0%			0.54
Dieldrin	4		0%			3.58
Endosulfan I	4		0%			1.85
Endosulfan II	4		0%			3.58
Endosulfan sulfate	4		0%			3.58
Endrin	4		0%			3.58
Endrin aldehyde	4		0%			3.58
Endrin ketone	4		0%			3.58
Gamma Chlordane	4		0%			1.85
gamma-BHC (Lindane)	4		0%			1.85
Heptachlor	4		0%			1.85
Heptachlor epoxide	4		0%			1.85
Methoxychlor	4		0%			19
Toxaphene	4		0%			185
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	4		0%			184
1,2-Dichlorobenzene	4		0%			184
1,3-Dichlorobenzene	4		0%			184
1,4-Dichlorobenzene	4		0%			184
2,2'-Oxybis(1-Chloropropane)	4		0%			184
2,4,5-Trichlorophenol	4		0%			184
2,4,6-Trichlorophenol	4		0%			184
2,4-Dichlorophenol	4		0%			184
2,4-Dinitrophenol	4		0%			925
2,4-Dinitrotoluene	4		0%			184
2,6-Dinitrotoluene	4		0%			184
2-Chloronaphthalene	4		0%			184
2-Chlorophenol	4		0%			184
2-Methylnaphthalene	4		0%			184
2-Methylphenol (o-cresol)	4		0%			184
2-Nitroaniline	4		0%			925
2-Nitrophenol	4		0%			184
3,3'-Dichlorobenzidine	4		0%			359
3-Methylphenol/4-Methylphenol	4		0%			184
3-Nitroaniline	4		0%			925
4,6-Dinitro-2-methylphenol	4		0%			925
4-Bromophenylphenyl ether	4		0%			184
4-Chloro-3-methylphenol	4		0%			184
4-Chloroaniline	4		0%			359
4-Chlorophenylphenyl ether	4		0%			184
4-Nitroaniline	4		0%			925
4-Nitrophenol	4		0%			925
Acenaphthene	4		0%			184
Acenaphthylene	4		0%			184
Anthracene	4		0%			184
Benzo(a)anthracene	4		0%			184
Benzo(a)pyrene	4		0%			98
Benzo(b)fluoranthene	4		0%			184
Benzo(g,h,i)perylene	4		0%			184
Benzo(k)fluoranthene	4		0%			184
bis(2-Chloroethoxy)methane	4		0%			184
bis(2-Chloroethyl)ether	4		0%			184
bis(2-Ethylhexyl)phthalate	4		0%			184
Butylbenzylphthalate	4		0%			184
Carbazole	4		0%			184
Chrysene	4		0%			184
Di-n-butylphthalate	4		0%			184
Di-n-octylphthalate	4		0%			184
Dibenzo(a,h)anthracene	4		0%			98
Dibenzofuran	4		0%			184
Diethylphthalate	4		0%			184

Appendix C-2.7

Reference Area Sediment Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dimethylphthalate	4		0%			184
Fluoranthene	4		0%			184
Fluorene	4		0%			184
Hexachlorobenzene	4		0%			75
Hexachlorobutadiene	4		0%			184
Hexachlorocyclopentadiene	4		0%			184
Hexachloroethane	4		0%			184
Indeno(1,2,3-cd)pyrene	4		0%			184
Isophorone	4		0%			184
N-Nitroso-di-n-propylamine	4		0%			184
N-Nitrosodiphenylamine	4		0%			184
Naphthalene	4		0%			184
Nitrobenzene	4		0%			184
Pentachlorophenol	4		0%			925
Phenanthrene	4		0%			184
Phenol	4		0%			184
Pyrene	4		0%			184
Total PAHs	4		0%			98
VOCs, ug/kg						
1,1,1-Trichloroethane	4		0%			6.56
1,1,2,2-Tetrachloroethane	4		0%			6.56
1,1,2-Trichloroethane	4		0%			6.56
1,1-Dichloroethane	4		0%			6.56
1,1-Dichloroethene	4		0%			5.96
1,2-Dichloroethane	4		0%			6.56
1,2-Dichloropropane	4		0%			6.56
2-Butanone (MEK)	4	3	75%	14	40	25
2-Hexanone	4		0%			33
4-Methyl-2-pentanone (MIBK)	4		0%			33
Acetone	4	3	75%	52	160	78
Benzene	4		0%			6.56
Bromodichloromethane	4		0%			6.56
Bromoform	4		0%			6.56
Bromomethane (Methyl bromide)	4		0%			13
Carbon disulfide	4		0%			6.56
Carbon tetrachloride	4		0%			6.56
Chlorobenzene	4		0%			6.56
Chloroethane	4		0%			13
Chloroform	4		0%			6.56
Chloromethane	4		0%			13
cis-1,3-Dichloropropene	4		0%			5.34
Cis/Trans-1,2-Dichloroethene	4		0%			6.56
Dibromochloromethane	4		0%			6.56
Ethylbenzene	4		0%			6.56
Methylene chloride (Dichloromethane)	4		0%			6.56
Styrene	4		0%			6.56
Tetrachloroethene	4		0%			6.56
Toluene	4		0%			6.56
trans-1,3-Dichloropropene	4		0%			5.34
Trichloroethene	4		0%			6.56
Vinyl chloride	4		0%			13
Xylenes, Total	4		0%			6.56

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.8

Reference Area Sediment Dioxin Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	4	4	100%	3.47E+00	8.57E+00	5.24E+00
1,2,3,4,6,7,8,9-OCDF	4	4	100%	1.43E-02	1.36E-01	9.63E-02
1,2,3,4,6,7,8-HpCDD	4	4	100%	1.28E-01	1.62E-01	1.46E-01
1,2,3,4,6,7,8-HpCDF	4	4	100%	5.90E-03	3.07E-02	2.26E-02
1,2,3,4,7,8,9-HpCDF	4	1	25%	3.00E-03	3.00E-03	1.31E-03
1,2,3,4,7,8-HxCDD	4	3	75%	1.10E-03	2.20E-03	1.45E-03
1,2,3,4,7,8-HxCDF	4	2	50%	2.90E-03	3.00E-03	1.85E-03
1,2,3,6,7,8-HxCDD	4	4	100%	3.30E-03	4.60E-03	4.08E-03
1,2,3,6,7,8-HxCDF	4	1	25%	1.30E-03	1.30E-03	6.08E-04
1,2,3,7,8,9-HxCDD	4	4	100%	3.40E-03	5.10E-03	4.40E-03
1,2,3,7,8,9-HxCDF	4		0%			1.09E-04
1,2,3,7,8-PeCDD	4	2	50%	1.30E-03	1.50E-03	1.03E-03
1,2,3,7,8-PeCDF	4	1	25%	1.10E-03	1.10E-03	4.46E-04
2,3,4,6,7,8-HxCDF	4	2	50%	1.60E-03	1.80E-03	1.05E-03
2,3,4,7,8-PeCDF	4	1	25%	1.30E-03	1.30E-03	6.61E-04
2,3,7,8-TCDD	4	2	50%	6.40E-04	3.50E-03	1.16E-03
2,3,7,8-TCDF	4	4	100%	7.60E-04	1.40E-03	1.22E-03
Total HpCDD	4	4	100%	2.78E-01	3.47E-01	3.23E-01
Total HpCDF	4	2	50%	1.64E-02	1.13E-01	5.81E-02
Total HxCDD	4	1	25%	4.58E-02	4.58E-02	2.88E-02
Total HxCDF	4	3	75%	6.20E-03	2.52E-02	1.65E-02
Total PeCDD	4	1	25%	2.10E-02	2.10E-02	1.75E-02
Total PeCDF	4		0%			3.96E-03
Total TCDD	4		0%			1.17E-02
Total TCDF	4	2	50%	6.80E-03	1.45E-02	9.14E-03

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.9

Sediment Summary Statistics for Dead Creek Sector F (Combined Shallow (0-2 inch) and Deep "Industry Specific" Samples)
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
2,4,5-T	3	0	0%			63
2,4,5-TP (Silvex)	3	0	0%			63
2,4-D	3	1	33%	23	23	66
2,4-DB	3	0	0%			63
Dalapon	3	0	0%			517
Dicamba	3	0	0%			151
Dichloroprop	3	0	0%			762
Dinoseb	3	0	0%			762
MCPA	3	0	0%			15067
MCPP	3	0	0%			15067
Pentachlorophenol	3	0	0%			104
Aluminum	3	3	100%	7800	17000	12933
Antimony	2	2	100%	2.5	2.6	2.55
Arsenic	3	3	100%	8	19	14.0
Barium	3	3	100%	150	270	223
Beryllium	3	3	100%	0.53	0.89	0.76
Cadmium	3	3	100%	7.4	47	23
Calcium	3	3	100%	11000	13000	11667
Chromium	3	3	100%	19	38	29
Cobalt	3	3	100%	5.5	13	9.8
Copper	19	19	100%	26	5400	1100
Cyanide, Total	3	0	0%			0.95
Iron	3	3	100%	14000	26000	20667
Lead	3	3	100%	110	320	180
Magnesium	3	3	100%	4100	6800	5400
Manganese	3	3	100%	170	510	303
Mercury	3	3	100%	0.3	1.1	0.62
Molybdenum	3	3	100%	0.7	3.7	1.7
Nickel	3	3	100%	90	390	220
Potassium	3	3	100%	1600	2900	2400
Selenium	3	0	0%			1.8
Silver	3	0	0%			1.8
Sodium	3	0	0%			132
Thallium	3	0	0%			1.8
Vanadium	3	3	100%	25	51	39
Zinc	19	19	100%	510	11000	4848
pH	3	3	100%	6.71	6.87	6.81
Total Organic Carbon (mg/kg dry	19	19	100%	15000	140000	55237
Decachlorobiphenyl	19	13	68%	32	460	103
Dichlorobiphenyl	19	0	0%			7.7
Heptachlorobiphenyl	19	11	58%	13	260	49
Hexachlorobiphenyl	19	3	16%	17	22	17
Monochlorobiphenyl	19	0	0%			7.7
Nonachlorobiphenyl	19	11	58%	21	270	54
Octachlorobiphenyl	19	8	42%	5.8	27	25
Pentachlorobiphenyl	19	17	89%	13	3700	504
Tetrachlorobiphenyl	19	12	63%	18	1600	197
Trichlorobiphenyl	19	4	21%	6.4	17	9.5
Total PCBs	19	17	89%	76	6471	929
4,4'-DDD	3	1	33%	3.8	3.8	11
4,4'-DDE	3	3	100%	2.5	11	7.2
4,4'-DDT	3	1	33%	4.5	4.5	11
Total DDT	3	3	100%	19	43	30
Aldrin	3	1	33%	4.1	4.1	6.4
Alpha Chlordane	3	3	100%	0.84	5.3	3.6
alpha-BHC	3	0	0%			1.9
beta-BHC	3	0	0%			1.9
delta-BHC	3	1	33%	0.34	0.34	1.6
Dieldrin	3	2	67%	0.99	9.3	9.3

Appendix C-2.9

Sediment Summary Statistics for Dead Creek Sector F (Combined Shallow (0-2 inch) and Deep "Industry Specific" Samples)
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Endosulfan I	3	3	100%	1.2	5.7	3.0
Endosulfan II	3	3	100%	1.8	8.1	5.1
Endosulfan sulfate	3	1	33%	2.8	2.8	11
Endrin	3	2	67%	1.7	1.7	7.0
Endrin aldehyde	3	3	100%	3.6	14	8.9
Endrin ketone	3	3	100%	3.8	10	7.0
Gamma Chlordane	3	3	100%	2.4	17	9.0
gamma-BHC (Lindane)	3	0	0%			6.3
Heptachlor	3	1	33%	0.93	0.93	4.6
Heptachlor epoxide	3	2	67%	0.51	5.4	5.0
Methoxychlor	3	3	100%	7.3	24	15
Toxaphene	3	0	0%			630
1,2,4-Trichlorobenzene	3	0	0%			318
1,2-Dichlorobenzene	3	0	0%			318
1,3-Dichlorobenzene	3	0	0%			318
1,4-Dichlorobenzene	3	0	0%			318
2,2'-Oxybis(1-Chloropropane)	3	0	0%			318
2,4,5-Trichlorophenol	3	0	0%			318
2,4,6-Trichlorophenol	3	0	0%			318
2,4-Dichlorophenol	3	0	0%			318
2,4-Dinitrophenol	3	0	0%			1600
2,4-Dinitrotoluene	3	0	0%			318
2,6-Dinitrotoluene	3	0	0%			318
2-Chloronaphthalene	3	0	0%			318
2-Chlorophenol	3	0	0%			318
2-Methylnaphthalene	3	0	0%			318
2-Methylphenol (o-cresol)	3	0	0%			318
2-Nitroaniline	3	0	0%			1600
2-Nitrophenol	3	0	0%			318
3,3'-Dichlorobenzidine	3	0	0%			612
3-Methylphenol/4-Methylphenol	3	0	0%			318
3-Nitroaniline	3	0	0%			1600
4,6-Dinitro-2-methylphenol	3	0	0%			1600
4-Bromophenylphenyl ether	3	0	0%			318
4-Chloro-3-methylphenol	3	0	0%			318
4-Chloroaniline	3	0	0%			612
4-Chlorophenylphenyl ether	3	0	0%			318
4-Nitroaniline	3	0	0%			1600
4-Nitrophenol	3	0	0%			1600
Acenaphthene	3	0	0%			318
Acenaphthylene	3	0	0%			318
Anthracene	3	0	0%			318
Benzo(a)anthracene	3	0	0%			318
Benzo(a)pyrene	3	0	0%			168
Benzo(b)fluoranthene	3	0	0%			318
Benzo(g,h,i)perylene	3	0	0%			318
Benzo(k)fluoranthene	3	0	0%			318
bis(2-Chloroethoxy)methane	3	0	0%			318
bis(2-Chloroethyl)ether	3	0	0%			318
bis(2-Ethylhexyl)phthalate	3	0	0%			318
Butylbenzylphthalate	3	0	0%			318
Carbazole	3	0	0%			318
Chrysene	3	1	33%	74	74	276
Di-n-butylphthalate	3	0	0%			318
Di-n-octylphthalate	3	0	0%			318
Dibenzo(a,h)anthracene	3	0	0%			168
Dibenzofuran	3	0	0%			318
Diethylphthalate	3	0	0%			318
Dimethylphthalate	3	0	0%			318

Appendix C-2.9

Sediment Summary Statistics for Dead Creek Sector F (Combined Shallow (0-2 inch) and Deep "Industry Specific" Samples)
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Fluoranthene	3	2	67%	120	130	232
Fluorene	3	0	0%			318
Hexachlorobenzene	3	0	0%			132
Hexachlorobutadiene	3	0	0%			318
Hexachlorocyclopentadiene	3	0	0%			318
Hexachloroethane	3	0	0%			318
Indeno(1,2,3-cd)pyrene	3	0	0%			318
Isophorone	3	0	0%			318
N-Nitroso-di-n-propylamine	3	0	0%			318
N-Nitrosodiphenylamine	3	0	0%			318
Naphthalene	3	0	0%			318
Nitrobenzene	3	0	0%			318
Pentachlorophenol	3	0	0%			1600
Phenanthrene	3	0	0%			318
Phenol	3	0	0%			318
Pyrene	3	0	0%			318
Total PAHs	3	2	67%	194	440	360
1,1,1-Trichloroethane	3	0	0%			14.0
1,1,2,2-Tetrachloroethane	3	0	0%			14.0
1,1,2-Trichloroethane	3	0	0%			14.0
1,1-Dichloroethane	3	0	0%			14.0
1,1-Dichloroethene	3	0	0%			13.0
1,2-Dichloroethane	3	0	0%			14.0
1,2-Dichloropropane	3	0	0%			14.0
2-Butanone (MEK)	3	0	0%			69.2
2-Hexanone	3	0	0%			69.2
4-Methyl-2-pentanone (MIBK)	3	0	0%			69.2
Acetone	3	0	0%			145
Benzene	3	0	0%			14.0
Bromodichloromethane	3	0	0%			14.0
Bromoform	3	0	0%			14.0
Bromomethane (Methyl bromide)	3	0	0%			27.8
Carbon disulfide	3	0	0%			14.0
Carbon tetrachloride	3	0	0%			14.0
Chlorobenzene	3	0	0%			14.0
Chloroethane	3	0	0%			27.8
Chloroform	3	0	0%			14.0
Chloromethane	3	0	0%			27.8
cis-1,3-Dichloropropene	3	0	0%			11.2
Cis/Trans-1,2-Dichloroethene	3	0	0%			14.0
Dibromochloromethane	3	0	0%			14.0
Ethylbenzene	3	1	33%	11	11	13.3
Methylene chloride (Dichloromethane)	3	0	0%			14.0
Styrene	3	0	0%			14.0
Tetrachloroethene	3	0	0%			14.0
Toluene	3	0	0%			14.0
trans-1,3-Dichloropropene	3	0	0%			11.2
Trichloroethene	3	0	0%			14.0
Vinyl chloride	3	0	0%			27.8
Xylenes, Total	3	0	0%			14.0

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-2.10

Sediment Summary Statistics for Borrow Pit Lake (Shallow (0-2 inches) and Deep "Industry Specific" Sediments)
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
2,4,5-T	3	0	0%			12
2,4,5-TP (Silvex)	3	0	0%			12
2,4-D	3	2	67%	8.8	11	11
2,4-DB	3	0	0%			12
Dalapon	3	0	0%			92
Dicamba	3	0	0%			28
Dichloroprop	3	0	0%			142
Dinoseb	3	0	0%			142
MCPA	3	0	0%			2817
MCPP	3	0	0%			2817
Pentachlorophenol	3	0	0%			24
Aluminum	3	3	100%	11000	16000	13667
Antimony	3	2	67%	1.5	2.2	2.22
Arsenic	3	3	100%	13	17	16
Barium	3	3	100%	240	420	350
Beryllium	3	3	100%	0.58	0.82	0.71
Cadmium	3	3	100%	1.6	2.7	2.1
Calcium	3	3	100%	11000	17000	14667
Chromium	3	3	100%	18	26	22
Cobalt	3	3	100%	7.1	10	8.9
Copper	24	24	100%	9.9	370	44
Cyanide, Total	3	0	0%			0.72
Iron	3	3	100%	28000	38000	34000
Lead	3	3	100%	34	58	48
Magnesium	3	3	100%	3600	5600	4667
Manganese	3	3	100%	940	1400	1213
Mercury	3	3	100%	0.1	0.16	0.12
Molybdenum	3	3	100%	0.37	0.92	0.60
Nickel	3	3	100%	35	54	47
Potassium	3	3	100%	1500	2200	1967
Selenium	3	0	0%			1.4
Silver	3	1	33%	0.79	0.79	1.1
Sodium	3	0	0%			93
Thallium	3	0	0%			1.4
Vanadium	3	3	100%	28	40	35
Zinc	24	24	100%	50	2100	354
pH	3	3	100%	6.74	7.06	6.94
Total Organic Carbon (mg/kg dry weight)	24	24	100%	3900	67000	20596
Decachlorobiphenyl	24	1	4%	33	33	25
Dichlorobiphenyl	24	0	0%			4.8
Heptachlorobiphenyl	24	0	0%			15
Hexachlorobiphenyl	24	0	0%			9.9
Monochlorobiphenyl	24	0	0%			4.8
Nonachlorobiphenyl	24	2	8%	10	250	25
Octachlorobiphenyl	24	0	0%			15
Pentachlorobiphenyl	24	2	8%	140	160	18
Tetrachlorobiphenyl	24	1	4%	48	48	12
Trichlorobiphenyl	24	0	0%			4.8
Total PCBs	24	3	13%	32	705	55
4,4'-DDD	3	0	0%			8.5
4,4'-DDE	3	3	100%	1.1	3.2	2.0
4,4'-DDT	3	2	67%	1.1	1.4	4.0
Total DDT	3	3	100%	2.2	12.7	6.0
Aldrin	3	0	0%			4.4
Alpha Chlordane	3	3	100%	0.48	3.2	1.6
alpha-BHC	3	0	0%			1.3
beta-BHC	3	0	0%			1.3
delta-BHC	3	0	0%			1.3
Dieldrin	3	2	67%	0.26	0.5	3.3
Endosulfan I	3	3	100%	1	4.9	2.9
Endosulfan II	3	0	0%			8.5
Endosulfan sulfate	3	2	67%	1.4	9.5	6.6

Appendix C-2.10

Sediment Summary Statistics for Borrow Pit Lake (Shallow (0-2 inches) and Deep "Industry Specific" Sediments)
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Endrin	3	0	0%			8.5
Endrin aldehyde	3	3	100%	1.2	2.2	1.6
Endrin ketone	3	1	33%	0.72	0.72	6.4
Gamma Chlordane	3	2	67%	0.74	3	2.8
gamma-BHC (Lindane)	3	1	33%	4.8	4.8	4.8
Heptachlor	3	0	0%			4.4
Heptachlor epoxide	3	1	33%	4.8	4.8	4.8
Methoxychlor	3	0	0%			44
Toxaphene	3	0	0%			440
1,2,4-Trichlorobenzene	3	0	0%			240
1,2-Dichlorobenzene	3	0	0%			240
1,3-Dichlorobenzene	3	0	0%			240
1,4-Dichlorobenzene	3	0	0%			240
2,2'-Oxybis(1-Chloropropane)	3	0	0%			240
2,4,5-Trichlorophenol	3	0	0%			240
2,4,6-Trichlorophenol	3	0	0%			240
2,4-Dichlorophenol	3	0	0%			240
2,4-Dinitrophenol	3	0	0%			1200
2,4-Dinitrotoluene	3	0	0%			240
2,6-Dinitrotoluene	3	0	0%			240
2-Chloronaphthalene	3	0	0%			240
2-Chlorophenol	3	0	0%			240
2-Methylnaphthalene	3	0	0%			240
2-Methylphenol (o-cresol)	3	0	0%			240
2-Nitroaniline	3	0	0%			1200
2-Nitrophenol	3	0	0%			240
3,3'-Dichlorobenzidine	3	0	0%			463
3-Methylphenol/4-Methylphenol	3	0	0%			240
3-Nitroaniline	3	0	0%			1200
4,6-Dinitro-2-methylphenol	3	0	0%			1200
4-Bromophenylphenyl ether	3	0	0%			240
4-Chloro-3-methylphenol	3	0	0%			240
4-Chloroaniline	3	0	0%			463
4-Chlorophenylphenyl ether	3	0	0%			240
4-Nitroaniline	3	0	0%			1200
4-Nitrophenol	3	0	0%			1200
Acenaphthene	3	0	0%			240
Acenaphthylene	3	0	0%			240
Anthracene	3	0	0%			240
Benzo(a)anthracene	3	0	0%			240
Benzo(a)pyrene	3	0	0%			127
Benzo(b)fluoranthene	3	0	0%			240
Benzo(g,h,i)perylene	3	0	0%			240
Benzo(k)fluoranthene	3	0	0%			240
bis(2-Chloroethoxy)methane	3	0	0%			240
bis(2-Chloroethyl)ether	3	0	0%			240
bis(2-Ethylhexyl)phthalate	3	0	0%			240
Butylbenzylphthalate	3	0	0%			240
Carbazole	3	0	0%			240
Chrysene	3	0	0%			240
Di-n-butylphthalate	3	0	0%			240
Di-n-octylphthalate	3	0	0%			240
Dibenzo(a,h)anthracene	3	0	0%			127
Dibenzofuran	3	0	0%			240
Diethylphthalate	3	0	0%			240
Dimethylphthalate	3	0	0%			240
Fluoranthene	3	0	0%			240
Fluorene	3	0	0%			240
Hexachlorobenzene	3	0	0%			97
Hexachlorobutadiene	3	0	0%			240
Hexachlorocyclopentadiene	3	0	0%			240
Hexachloroethane	3	0	0%			240
Indeno(1,2,3-cd)pyrene	3	0	0%			240

Appendix C-2.10

Sediment Summary Statistics for Borrow Pit Lake (Shallow (0-2 inches) and Deep "Industry Specific" Sediments)
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency Of Detection	Minimum Detected	Maximum Detected	Average Concentration
Isophorone	3	0	0%			240
N-Nitroso-di-n-propylamine	3	0	0%			240
N-Nitrosodiphenylamine	3	0	0%			240
Naphthalene	3	0	0%			240
Nitrobenzene	3	0	0%			240
Pentachlorophenol	3	0	0%			1200
Phenanthrene	3	0	0%			240
Phenol	3	0	0%			240
Pyrene	3	0	0%			240
Total PAHs	3	0	0%			240
1,1,1-Trichloroethane	3	0	0%			13
1,1,2,2-Tetrachloroethane	3	0	0%			13
1,1,2-Trichloroethane	3	0	0%			13
1,1-Dichloroethane	3	0	0%			13
1,1-Dichloroethene	3	0	0%			12
1,2-Dichloroethane	3	0	0%			13
1,2-Dichloropropane	3	0	0%			13
2-Butanone (MEK)	3	0	0%			65
2-Hexanone	3	0	0%			65
4-Methyl-2-pentanone (MIBK)	3	0	0%			65
Acetone	3	0	0%			130
Benzene	3	0	0%			13
Bromodichloromethane	3	0	0%			13
Bromoform	3	0	0%			13
Bromomethane (Methyl bromide)	3	0	0%			26
Carbon disulfide	3	0	0%			13
Carbon tetrachloride	3	0	0%			13
Chlorobenzene	3	0	0%			13
Chloroethane	3	0	0%			26
Chloroform	3	0	0%			13
Chloromethane	3	0	0%			26
cis-1,3-Dichloropropene	3	0	0%			10
Cis/Trans-1,2-Dichloroethene	3	0	0%			13
Dibromochloromethane	3	0	0%			13
Ethylbenzene	3	0	0%			13
Methylene chloride (Dichloromethane)	3	0	0%			13
Styrene	3	0	0%			13
Tetrachloroethene	3	0	0%			13
Toluene	3	0	0%			13
trans-1,3-Dichloropropene	3	0	0%			10
Trichloroethene	3	0	0%			13
Vinyl chloride	3	0	0%			26
Xylenes, Total	3	0	0%			13

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Comparison of Detection Limits to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake Shallow Sediment
Sauget Area I

Compounds	Maximum Detection Limit or Range	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	A COPC for this Medium?	Why was this a COPC?	Comment on detection limits.
Herbicides (ug/kg)							
2,4,5-T	240				No		No criteria available to evaluate detection limit.
2,4,5-TP (Silvex)	240				No		No criteria available to evaluate detection limit.
2,4-D	240				Yes	No criteria; greater than background	No criteria available to evaluate detection limit.
2,4-DB	240				No		No criteria available to evaluate detection limit.
Dalapon	2000				No		No criteria available to evaluate detection limit.
Dicamba	570				No		No criteria available to evaluate detection limit.
Dichloroprop	2900				No		No criteria available to evaluate detection limit.
Dinoseb	2900				No		No criteria available to evaluate detection limit.
MCPA	57000				No		No criteria available to evaluate detection limit.
MCPP	57000				No		No criteria available to evaluate detection limit.
Pentachlorophenol	490				No		No criteria available to evaluate detection limit.
Metals (mg/kg)							
Aluminum	All Detected				No		No criteria available to evaluate detection limit.
Antimony	5.9				Yes	No criteria; greater than background	No criteria available to evaluate detection limit.
Arsenic	All Detected	9.79	7.24	6	Yes	Greater than criteria and background	Detected in all samples.
Barium	All Detected				Yes	No criteria; greater than background	No criteria available to evaluate detection limit.
Beryllium	All Detected				No		No criteria available to evaluate detection limit.
Cadmium	All Detected	0.99	0.676	0.6	Yes	Greater than criteria and background	Detected in all samples.
Calcium	All Detected				No		No criteria - a common nutrient.
Chromium	All Detected	43.4	52.3	26	Yes	Greater than criteria.	Detected in all samples.
Cobalt	All Detected			50	No		Detected in all samples.
Copper	All Detected	31.6	18.7	16	Yes	Greater than criteria and background	Detected in all samples.
Cyanide, Total	**1.2 to 2.6**			0.1	No		Detection limits greater than criteriain 6/6 samples; source of uncertainty.
Iron	All Detected			20000	Yes	Greater than criteria	Detected in all samples.
Lead	All Detected	35.8	30.2	31	Yes	Greater than criteria and background	Detected in all samples.
Magnesium	All Detected				No		No criteria - a common nutrient.
Manganese	All Detected			460	Yes	Greater than criteria.	Detected in all samples.
Mercury	All Detected	0.18	0.13	0.2	Yes	Greater than criteria and background	Detected in all samples.
Molybdenum	All Detected				Yes	No criteria; greater than background	No criteria available to evaluate detection limit.
Nickel	All Detected	22.7	15.9	16	Yes	Greater than criteria; greater than background	Detected in all samples.
Potassium	All Detected				No		No criteria - common nutrient.
Selenium	4.8				No		No criteria available to evaluate detection limit.
Silver	**2.3 to 4.8**		0.733	0.5	Yes	Detected at a concentration higher than the criteria.	Detection limit greater than criteria in 5/6 samples: source of uncertainty.
Sodium	350				No		No criteria - common nutrient.
Thallium	4.8				No		No criteria available to evaluate detection limit.
Vanadium	All Detected				No		No criteria available to evaluate detection limit.
Zinc	All Detected	121	124	120	Yes	Greater than criteria and background	Detected in all samples.
pH	All Detected				No	NA	NA
Total Organic Carbon (mg/kg dry weight)	All Detected				No	NA	NA

Comparison of Detection Limits to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake Shallow Sediment
Sauget Area I

Compounds	Maximum Detection Limit or Range	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	A COPC for this Medium?	Why was this a COPC?	Comment on detection limits.
PCBs and Pesticides (ug/kg)							
Decachlorobiphenyl	310				No		No criteria available to evaluate detection limit.
Dichlorobiphenyl	60				No		No criteria available to evaluate detection limit.
Heptachlorobiphenyl	180				No		No criteria available to evaluate detection limit.
Hexachlorobiphenyl	120				No		No criteria available to evaluate detection limit.
Monochlorobiphenyl	60				No		No criteria available to evaluate detection limit.
Nonachlorobiphenyl	310				No		No criteria available to evaluate detection limit.
Octachlorobiphenyl	180				No		No criteria available to evaluate detection limit.
Pentachlorobiphenyl	120				No		No criteria available to evaluate detection limit.
Tetrachlorobiphenyl	120				No		No criteria available to evaluate detection limit.
Trichlorobiphenyl	60				No		No criteria available to evaluate detection limit.
Total PCBs	19 to 120	59.8	21.6	70	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 2/6 samples; source of uncertainty.
4,4'-DDD	14 to 35	4.88	1.22	8	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 5/6 samples; source of uncertainty
4,4'-DDE	All Detected	3.16	2.07	5	Yes	Greater than criteria; ND in background	Detected in all samples.
4,4'-DDT*	19 to 35	4.16	1.19	8	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 3/6 samples; source of uncertainty.
Total DDT	All Detected	5.28	3.89	7	Yes	Greater than criteria; ND in background	Concentration is sum of concentrations of DDE, DDD, and DDT.
Aldrin	7.1 to 18			2	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 5/6 samples; source of uncertainty.
Alpha Chlordane**	All Detected	3.24	2.26	7	Yes	Greater than criteria; ND in background	Detected in all samples.
alpha-BHC	5.3			6	No		Detection limits less than criteria.
beta-BHC	2.3 to 5.3			5	No		Detection limit greater than criteria in 1/6 samples; source of uncertainty.
delta-BHC	5.3				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Dieldrin	18 to 35	1.9	0.715	2	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 2/6 samples; source of uncertainty.
Endosulfan I	All Detected				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Endosulfan II	19				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Endosulfan sulfate	35				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Endrin	14 to 35	2.22		3	No		Detection limit greater than criteria in 4/6 samples; source of uncertainty.
Endrin aldehyde	All Detected				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Endrin ketone	19				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Gamma Chlordane**	9.4	3.24	2.26	7	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 1/6 samples; source of uncertainty.
gamma-BHC (Lindane)	7.8 to 18	2.37	0.32	3	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 5/6 samples; source of uncertainty.
Heptachlor	7.1 to 18			0.3 NEL	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 5/6 samples; source of uncertainty.
Heptachlor epoxide	9.4 to 18	2.47		5	Yes	Greater than criteria; ND in background	Detection limit greater than criteria in 3/6 samples; source of uncertainty.

Comparison of Detection Limits to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake Shallow Sediment
Sauget Area I

Compounds	Maximum Detection Limit or Range	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	A COPC for this Medium?	Why was this a COPC?	Comment on detection limits.
Methoxychlor	99				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Toxaphene	1800				No		No criteria available to evaluate detection limit.
SVOCs ug/kg							
1,2,4-Trichlorobenzene	890				No		No criteria available to evaluate detection limit.
1,2-Dichlorobenzene	890				No		No criteria available to evaluate detection limit.
1,3-Dichlorobenzene	890				No		No criteria available to evaluate detection limit.
1,4-Dichlorobenzene	890				No		No criteria available to evaluate detection limit.
2,2'-Oxybis(1-Chloropropane)	890				No		No criteria available to evaluate detection limit.
2,4,5-Trichlorophenol	890				No		No criteria available to evaluate detection limit.
2,4,6-Trichlorophenol	890				No		No criteria available to evaluate detection limit.
2,4-Dichlorophenol	890				No		No criteria available to evaluate detection limit.
2,4-Dinitrophenol	4500				No		No criteria available to evaluate detection limit.
2,4-Dinitrotoluene	890				No		No criteria available to evaluate detection limit.
2,6-Dinitrotoluene	890				No		No criteria available to evaluate detection limit.
2-Chloronaphthalene	890				No		No criteria available to evaluate detection limit.
2-Chlorophenol	890				No		No criteria available to evaluate detection limit.
2-Methylnaphthalene	**400 to 890**		20.2		No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
2-Methylphenol (o-cresol)	890				No		No criteria available to evaluate detection limit.
2-Nitroaniline	4500				No		No criteria available to evaluate detection limit.
2-Nitrophenol	890				No		No criteria available to evaluate detection limit.
3,3'-Dichlorobenzidine	1700				No		No criteria available to evaluate detection limit.
3-Methylphenol/4-Methylphenol	890				No		No criteria available to evaluate detection limit.
3-Nitroaniline	4500				No		No criteria available to evaluate detection limit.
4,6-Dinitro-2-methylphenol	4500				No		No criteria available to evaluate detection limit.
4-Bromophenylphenyl ether	890				No		No criteria available to evaluate detection limit.
4-Chloro-3-methylphenol	890				No		No criteria available to evaluate detection limit.
4-Chloroaniline	1700				No		No criteria available to evaluate detection limit.
4-Chlorophenylphenyl ether	890				No		No criteria available to evaluate detection limit.
4-Nitroaniline	4500				No		No criteria available to evaluate detection limit.
4-Nitrophenol	4500				No		No criteria available to evaluate detection limit.
Acenaphthene	**400 to 890**		6.71		No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Acenaphthylene	**400 to 890**		5.87		No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Anthracene	**400 to 890**	57.2	46.9	220	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Benzo(a)anthracene	**400 to 890**	108	74.8	320	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Benzo(a)pyrene	**210 to 470**	150	88.8	370	No		Detection limit greater than criteria (TEC, TEL) in 6/6 samples; source of uncertainty.
Benzo(b)fluoranthene	890				No		No criteria available to evaluate detection limit.
Benzo(g,h,i)perylene	**400 to 890**			170	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.

Comparison of Detection Limits to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake Shallow Sediment
Sauget Area I

Compounds	Maximum Detection Limit or Range	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	A COPC for this Medium?	Why was this a COPC?	Comment on detection limits.
Benzo(k)fluoranthene	400 to 890			240	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
bis(2-Chloroethoxy)methane	890				No		No criteria available to evaluate detection limit.
bis(2-Chloroethyl)ether	890				No		No criteria available to evaluate detection limit.
bis(2-Ethylhexyl)phthalate	400 to 890		182		No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Butylbenzylphthalate	890				No		No criteria available to evaluate detection limit.
Carbazole	890				No		No criteria available to evaluate detection limit.
Chrysene	470 to 890	166	108	340	No		Detection limit greater than criteria in 5/6 samples; source of uncertainty.
Di-n-butylphthalate	890				No		No criteria available to evaluate detection limit.
Di-n-octylphthalate	890				No		No criteria available to evaluate detection limit.
Dibenzo(a,h)anthracene	210 to 470	33.0	6.22	60	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Dibenzofuran	890				No		No criteria available to evaluate detection limit.
Diethylphthalate	890				No		No criteria available to evaluate detection limit.
Dimethylphthalate	890				No		No criteria available to evaluate detection limit.
Fluoranthene	470 to 890	423	113	750	Yes	Greater than criteria; ND in background	Detection limit greater than criteria (TEC, TEL) in 4/6 samples; source of uncertainty.
Fluorene	400 to 890	77.4	21.2	190	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Hexachlorobenzene	160 to 370			20	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Hexachlorobutadiene	890				No		No criteria available to evaluate detection limit.
Hexachlorocyclopentadiene	890				No		No criteria available to evaluate detection limit.
Hexachloroethane	890				No		No criteria available to evaluate detection limit.
Indeno(1,2,3-cd)pyrene	400 to 890			200	No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Isophorone	890				No		No criteria available to evaluate detection limit.
N-Nitroso-di-n-propylamine	890				No		No criteria available to evaluate detection limit.
N-Nitrosodiphenylamine	890				No		No criteria available to evaluate detection limit.
Naphthalene	400 to 890	176	34.6		No		Detection limit greater than criteria in 6/6 samples; source of uncertainty.
Nitrobenzene	890				No		No criteria available to evaluate detection limit.
Pentachlorophenol	4500				No		No criteria available to evaluate detection limit.
Phenanthrene	400 to 890	204	86.7	560	No		Detection limit greater than criteria (TEC, TEL) in 6/6 samples; source of uncertainty.
Phenol	890				No		No criteria available to evaluate detection limit.
Pyrene	400 to 890	195	153	490	No		Detection limit greater than criteria (TEC, TEL) in 6/6 samples; source of uncertainty.
Total PAHs	890	1610	1684	4000	No		Detection limit less than criteria.
VOCs ug/kg							
1,1,1-Trichloroethane	41				No		No criteria available to evaluate detection limit.
1,1,2,2-Tetrachloroethane	41				No		No criteria available to evaluate detection limit.

Comparison of Detection Limits to Sediment Quality Guidelines
Dead Creek Segment F and Borrow Pit Lake Shallow Sediment
Sauget Area I

Compounds	Maximum Detection Limit or Range	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	A COPC for this Medium?	Why was this a COPC?	Comment on detection limits.
1,1,2-Trichloroethane	41				No		No criteria available to evaluate detection limit.
1,1-Dichloroethane	41				No		No criteria available to evaluate detection limit.
1,1-Dichloroethene	38				No		No criteria available to evaluate detection limit.
1,2-Dichloroethane	41				No		No criteria available to evaluate detection limit.
1,2-Dichloropropane	41				No		No criteria available to evaluate detection limit.
2-Butanone (MEK)	200				No		No criteria available to evaluate detection limit.
2-Hexanone	200				No		No criteria available to evaluate detection limit.
4-Methyl-2-pentanone (MIBK)	200				No		No criteria available to evaluate detection limit.
Acetone	410				No		No criteria available to evaluate detection limit.
Benzene	41				No		No criteria available to evaluate detection limit.
Bromodichloromethane	41				No		No criteria available to evaluate detection limit.
Bromoform	41				No		No criteria available to evaluate detection limit.
Bromomethane (Methyl bromide)	82				No		No criteria available to evaluate detection limit.
Carbon disulfide	41				No		No criteria available to evaluate detection limit.
Carbon tetrachloride	41				No		No criteria available to evaluate detection limit.
Chlorobenzene	41				No		No criteria available to evaluate detection limit.
Chloroethane	82				No		No criteria available to evaluate detection limit.
Chloroform	41				No		No criteria available to evaluate detection limit.
Chloromethane	82				No		No criteria available to evaluate detection limit.
cis-1,3-Dichloropropene	33				No		No criteria available to evaluate detection limit.
Cis/Trans-1,2-Dichloroethene	41				No		No criteria available to evaluate detection limit.
Dibromochloromethane	41				No		No criteria available to evaluate detection limit.
Ethylbenzene	41				Yes	No criteria; ND in background	No criteria available to evaluate detection limit.
Methylene chloride (Dichloromethane)	41				No		No criteria available to evaluate detection limit.
Styrene	41				No		No criteria available to evaluate detection limit.
Tetrachloroethene	41				No		No criteria available to evaluate detection limit.
Toluene	41				No		No criteria available to evaluate detection limit.
trans-1,3-Dichloropropene	33				No		No criteria available to evaluate detection limit.
Trichloroethene	41				No		No criteria available to evaluate detection limit.
Vinyl chloride	82				No		No criteria available to evaluate detection limit.
Xylenes, Total	41				No		No criteria available to evaluate detection limit.
Dioxin TEQ (mammal) pg/g	NA				Yes	Greater than reference area.	NA

Notes: Except where noted, concentrations in ug/kg for organic constituens; mg/kg for inorganic constituents.
[1] Threshold Effects Concentration - MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. *Arch. Environ. Contam. Toxicol.* 39:20-31.
[2] Sediment Quality Assessment Guidelines - MacDonald Environmental Sciences, Ltd. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters, Volume 1-- Development and Evaluation of Sediment Quality Assessment Guidelines. Prepared for FLDEP. November, 1994.
[3] Lowest Effects Level - Persaud, D., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of Environment and Energy. August 1993.
* Ontario and Sediment Quality Guideline values are for 2,4'-DDT and 4,4'-DDT combined
** Florida, Ontario, and Sediment Quality Guideline values are for Chlordane
Bold indicates detection limit exceeds screening benchmark.
NA = Not applicable; ND = No detected
NEL = No-Effect Level

Comparison of Detection Limits to Sediment Quality Guidelines
Dead Creek Segment F Combined Shallow and "Industry Specific" Sediment Samples
Sauget Area I

Compounds[4]	Maximum Detection Limit or Range	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	A COPC for this Medium?	Why was this a COPC?	Comment on detection limits.
Metals (mg/kg)							
Copper	All Detected	31.6	18.7	16	Yes	Greater than criteria	Detected in all samples.
Zinc	All Detected	121	124	120	Yes	Greater than criteria	Detected in all samples.
Total Organic Carbon (mg/kg dry weight)	All Detected				No	NA	NA
PCBs (ug/kg)							
Decachlorobiphenyl	24-310				No		No criteria available to evaluate detection limit.
Dichlorobiphenyl	4.8-61				No		No criteria available to evaluate detection limit.
Heptachlorobiphenyl	15-180				No		No criteria available to evaluate detection limit.
Hexachlorobiphenyl	9.8-120				No		No criteria available to evaluate detection limit.
Monochlorobiphenyl	4.8-61				No		No criteria available to evaluate detection limit.
Nonachlorobiphenyl	24-310				No		No criteria available to evaluate detection limit.
Octachlorobiphenyl	15-180				No		No criteria available to evaluate detection limit.
Pentachlorobiphenyl	9.8-120				No		No criteria available to evaluate detection limit.
Tetrachlorobiphenyl	9.8-120				No		No criteria available to evaluate detection limit.
Trichlorobiphenyl	4.8-61				No		No criteria available to evaluate detection limit.
Total PCBs	**24-310**	59.8	21.6	70	Yes	Greater than criteria	Detection limit greater than criteria (TEL) in 2/19 samples; slight source of uncertainty.

Notes: Except where noted, concentrations in ug/kg for organic constituens; mg/kg for inorganic constituents.

[1] Threshold Effects Concentration - MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. *Arch. Environ. Contam. Toxicol.* 39:20-31.

[2] Sediment Quality Assessment Guidelines - MacDonald Environmental Sciences, Ltd. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters, *Volume 1-- Development and Evaluation of Sediment Quality Assessment Guidelines*. Prepared for FLDEP. November, 1994.

[3] Lowest Effects Level - Persaud, D., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of Environment and Energy. August 1993.

[4] Evaluation for remaining analytes is the same as for shallow sediments (Industry specific sediment samples were analyzed for copper, zinc, TPH, TOC, and PCBs)

Bold indicates detection limit exceeds screening benchmark.

Comparison of Detection Limits to Sediment Quality Guidelines
Borrow Pit Lake "Industry Specific" Sediment Samples
Sauget Area I

Compounds[4]	Maximum Detection Limit or Range	Sediment Quality Guidelines[1] TEC	Florida SQAG[2] TEL	Ontario Guidelines[3] LEL	A COPC for this Medium?	Why was this a COPC?	Comment on detection limits.
Metals (mg/kg)							
Copper	All Detected	31.6	18.7	16	Yes	Greater than criteria	Detected in all samples.
Zinc	All Detected	121	124	120	Yes	Greater than criteria	Detected in all samples.
Total Organic Carbon (mg/kg dry weight)	All Detected				No	NA	NA
PCBs (ug/kg)							
Decachlorobiphenyl	20-450				No		No criteria available to evaluate detection limit.
Dichlorobiphenyl	3.9-89				No		No criteria available to evaluate detection limit.
Heptachlorobiphenyl	12-270				No		No criteria available to evaluate detection limit.
Hexachlorobiphenyl	7.9-180				No		No criteria available to evaluate detection limit.
Monochlorobiphenyl	3.9-89				No		No criteria available to evaluate detection limit.
Nonachlorobiphenyl	20-140				No		No criteria available to evaluate detection limit.
Octachlorobiphenyl	12-270				No		No criteria available to evaluate detection limit.
Pentachlorobiphenyl	7.9-57				No		No criteria available to evaluate detection limit.
Tetrachlorobiphenyl	7.9-180				No		No criteria available to evaluate detection limit.
Trichlorobiphenyl	3.9-89				No		No criteria available to evaluate detection limit.
Total PCBs	**20-140**	59.8	21.6	70	Yes	Greater than criteria	Detection limit slightly greater than criteria (TEL) in20/24 samples; slight source of uncertainty.

Notes: Except where noted, concentrations in ug/kg for organic constituents; mg/kg for inorganic constituents.

[1] Threshold Effects Concentration - MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. *Arch. Environ. Contam. Toxicol.* 39:20-31.

[2] Sediment Quality Assessment Guidelines - MacDonald Environmental Sciences, Ltd. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters, Volume 1-- Development and Evaluation of Sediment Quality Assessment Guidelines. Prepared for FLDEP. November, 1994.

[3] Lowest Effects Level - Persaud, D., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of Environment and Energy. August 1993.

[4] Evaluation for remaining analytes is the same as for shallow sediments (Industry specific sediment samples were analyzed for copper, zinc, TPH, TOC, and PCBs)

Bold indicates detection limit exceeds screening benchmark.

BIOTA SUMMARY STATISTICS

Summary Statistics for Borrow Pit Lake Largemouth Bass
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			5.00
2,4,5-TP (Silvex)	3		0%			5.00
2,4-D	3		0%			5.00
2,4-DB	3		0%			5.00
Dalapon	3		0%			1000
Dicamba	3	1	33%	1.9	1.9	5.63
Dichloroprop	3		0%			50
Dinoseb	3		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	3	1	33%	1800	1800	1267
MCPP[2-(4-chloro-2-methylphenoxy)-propan	3		0%			1000
Pentachlorophenol	3		0%			6.67
Metals, mg/kg						
Aluminum	3	2	67%	19	33	20
Antimony	3		0%			0.09
Arsenic	3		0%			3.17
Beryllium	3		0%			0.47
Cadmium	3		0%			0.23
Chromium	3	3	100%	0.45	0.93	0.64
Copper	3	3	100%	0.41	0.68	0.54
Cyanide, Total	3		0%			5
Lead	3		0%			0.23
Mercury	3	2	67%	0.057	0.064	0.04
Nickel	3		0%			4.70
Selenium	3	2	67%	0.6	0.63	0.49
Silver	3		0%			0.05
Zinc	3	3	100%	15	19	17
% Lipid	3	3	100%	1.5	1.8	1.60
PCB, ug/kg						
Decachlorobiphenyl	3		0%			25
Dichlorobiphenyl	3		0%			5.00
Heptachlorobiphenyl	3	2	67%	16	21	17
Hexachlorobiphenyl	3	3	100%	44	150	105
Monochlorobiphenyl	3		0%			5.00
Nonachlorobiphenyl	3		0%			25
Octachlorobiphenyl	3		0%			15
Pentachlorobiphenyl	3	3	100%	30	130	90
Tetrachlorobiphenyl	3	2	67%	19	46	25
Trichlorobiphenyl	3		0%			5.00
Total PCBs	3	3	100%	99	320	237
Pesticides, ug/kg						
4,4'-DDD	3		0%			6.50
4,4'-DDE	3	2	67%	15	21	14
4,4'-DDT	3		0%			6.50
Total DDT	3	2	67%	15	21	14
Aldrin	3		0%			3.40
Alpha Chlordane	3		0%			3.40
alpha-BHC	3		0%			3.40
beta-BHC	3		0%			3.40
delta-BHC	3		0%			3.40
Dieldrin	3		0%			6.50
Endosulfan I	3		0%			3.40
Endosulfan II	3		0%			6.50
Endosulfan sulfate	3		0%			6.50
Endrin	3		0%			6.50
Endrin aldehyde	3		0%			6.50
Endrin ketone	3		0%			6.50
Gamma Chlordane	3	2	67%	15	19	12
gamma-BHC (Lindane)	3		0%			3.40
Heptachlor	3	1	33%	1.5	1.5	2.77
Heptachlor epoxide	3		0%			3.40
Methoxychlor	3		0%			34
Toxaphene	3		0%			340
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			85
1,2-Dichlorobenzene	3		0%			85
1,3-Dichlorobenzene	3		0%			85
1,4-Dichlorobenzene	3		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	3		0%			85
2,4,5-Trichlorophenol	3		0%			210
2,4,6-Trichlorophenol	3		0%			85
2,4-Dichlorophenol	3		0%			85
2,4-Dimethylphenol	3		0%			85
2,4-Dinitrophenol	3		0%			210
2,4-Dinitrotoluene	3		0%			85
2,6-Dinitrotoluene	3		0%			85
2-Chloronaphthalene	3		0%			85
2-Chlorophenol	3		0%			85
2-Methyl-4,6-dinitrophenol	3		0%			210
2-Methylnaphthalene	3		0%			85

Summary Statistics for Borrow Pit Lake Largemouth Bass
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
2-Methylphenol (o-cresol)	3		0%			85
2-Nitroaniline	3		0%			210
2-Nitrophenol	3		0%			85
3&4-Methylphenol (m&p-cresol)	3		0%			85
3,3'-Dichlorobenzidine	3		0%			85
3-Nitroaniline	3		0%			210
4-Bromophenylphenyl ether	3		0%			85
4-Chloro-3-methylphenol	3		0%			85
4-Chloroaniline	3		0%			85
4-Chlorophenylphenyl ether	3		0%			85
4-Nitroaniline	3		0%			210
4-Nitrophenol	3		0%			210
Acenaphthene	3		0%			85
Acenaphthylene	3		0%			85
Anthracene	3		0%			85
Benzo(a)anthracene	3		0%			85
Benzo(a)pyrene	3		0%			85
Benzo(b)fluoranthene	3		0%			85
Benzo(g,h,i)perylene	3		0%			85
Benzo(k)fluoranthene	3		0%			85
bis(2-Chloroethoxy)methane	3		0%			85
bis(2-Chloroethyl)ether	3		0%			85
bis(2-Ethylhexyl)phthalate	3		0%			92
Butylbenzylphthalate	3		0%			85
Carbazole	3		0%			85
Chrysene	3		0%			85
Di-n-butylphthalate	3	1	33%	32	32	67
Di-n-octylphthalate	3		0%			85
Dibenzo(a,h)anthracene	3		0%			85
Dibenzofuran	3		0%			85
Diethylphthalate	3		0%			85
Dimethylphthalate	3		0%			85
Fluoranthene	3		0%			85
Fluorene	3		0%			85
Hexachlorobenzene	3		0%			85
Hexachlorobutadiene	3		0%			85
Hexachlorocyclopentadiene	3		0%			85
Hexachloroethane	3		0%			85
Indeno(1,2,3-cd)pyrene	3		0%			85
Isophorone	3		0%			85
n-Nitrosodi-n-propylamine	3		0%			85
N-Nitrosodiphenylamine/Diphenylamine	3		0%			85
Naphthalene	3		0%			85
Nitrobenzene	3		0%			85
Pentachlorophenol	3		0%			210
Phenanthrene	3		0%			85
Phenol	3		0%			85
Pyrene	3		0%			85
Total PAHs	3		0%			85
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3		0%			6.53E-03
1,2,3,4,6,7,8,9-OCDF	3		0%			1.05E-03
1,2,3,4,6,7,8-HpCDD	3		0%			8.67E-04
1,2,3,4,6,7,8-HpCDF	3		0%			1.00E-04
1,2,3,4,7,8,9-HpCDF	3		0%			1.67E-04
1,2,3,4,7,8-HxCDD	3		0%			1.50E-04
1,2,3,4,7,8-HxCDF	3	1	33%	4.80E-04	4.80E-04	2.43E-04
1,2,3,6,7,8-HxCDD	3	1	33%	5.40E-04	5.40E-04	2.93E-04
1,2,3,6,7,8-HxCDF	3	1	33%	2.30E-04	2.30E-04	1.43E-04
1,2,3,7,8,9-HxCDD	3		0%			1.33E-04
1,2,3,7,8,9-HxCDF	3		0%			1.00E-04
1,2,3,7,8-PeCDD	3	1	33%	8.10E-04	8.10E-04	5.02E-04
1,2,3,7,8-PeCDF	3	1	33%	1.10E-03	1.10E-03	3.97E-04
2,3,4,6,7,8-HxCDF	3	1	33%	3.80E-04	3.80E-04	2.10E-04
2,3,4,7,8-PeCDF	3	2	67%	7.10E-04	9.70E-04	6.63E-04
2,3,7,8-TCDD	3	2	67%	7.50E-04	9.00E-04	7.33E-04
2,3,7,8-TCDF	3	3	100%	8.10E-03	1.14E-02	9.27E-03
Total HpCDD	3	2	67%	1.40E-03	2.00E-03	1.43E-03
Total HpCDF	3	1	33%	6.70E-03	6.70E-03	4.37E-03
Total HxCDD	3	1	33%	5.40E-04	5.40E-04	4.80E-04
Total HxCDF	3		0%			1.68E-02
Total PeCDD	3	1	33%	8.10E-04	8.10E-04	5.02E-04
Total PeCDF	3		0%			1.91E-02
Total TCDD	3	1	33%	7.50E-04	7.50E-04	5.83E-04
Total TCDF	3		0%			3.05E-02

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.2

Reference Area Largemouth Bass Data
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	4		0%			5.00
2,4,5-TP (Silvex)	4		0%			5.00
2,4-D	4		0%			5.00
2,4-DB	4		0%			5.00
Dalapon	4		0%			1000
Dicamba	4		0%			10
Dichloroprop	4		0%			50
Dinoseb	4		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	4		0%			1000
MCPP[2-(4-chloro-2-methylphenoxy)-propan	4		0%			1000
Pentachlorophenol	4		0%			6.25
Metals, mg/kg						
Aluminum	4	4	100%	22.00	81.00	41
Antimony	4		0%			0.09
Arsenic	4		0%			2.10
Beryllium	4		0%			0.46
Cadmium	4		0%			0.23
Chromium	4	4	100%	0.19	0.36	0.28
Copper	4	4	100%	0.36	0.84	0.52
Cyanide, Total	4		0%			5.00
Lead	4		0%			0.23
Mercury	4	4	100%	0.10	0.14	0.11
Nickel	4		0%			4.56
Selenium	4	3	75%	0.53	0.86	0.60
Silver	4		0%			0.05
Zinc	4	4	100%	8.50	15.00	11
% Lipid	4	4	100%	0.66	2.40	1.19
PCBs and Pesticides, ug/kg						
Decachlorobiphenyl	4		0%			25
Dichlorobiphenyl	4		0%			5.00
Heptachlorobiphenyl	4		0%			15
Hexachlorobiphenyl	4	1	25%	9.30	9.30	9.83
Monochlorobiphenyl	4		0%			5.00
Nonachlorobiphenyl	4		0%			25
Octachlorobiphenyl	4		0%			15
Pentachlorobiphenyl	4	1	25%	9.50	9.50	9.88
Tetrachlorobiphenyl	4		0%			10
Trichlorobiphenyl	4		0%			5.00
4,4'-DDD	4		0%			5.54
4,4'-DDE	4	4	100%	3.50	6.60	5.30
4,4'-DDT	4		0%			5.54
Aldrin	4		0%			2.89
Alpha Chlordane	4		0%			2.89
alpha-BHC	4		0%			2.89
beta-BHC	4		0%			2.89
delta-BHC	4		0%			2.89
Dieldrin	4	2	50%	5.30	5.60	5.01
Endosulfan I	4		0%			2.89
Endosulfan II	4		0%			5.54
Endosulfan sulfate	4		0%			5.54
Endrin	4		0%			5.54
Endrin aldehyde	4		0%			5.54
Endrin ketone	4		0%			5.54
Gamma Chlordane	4		0%			2.89
gamma-BHC (Lindane)	4		0%			2.89
Heptachlor	4		0%			2.89
Heptachlor epoxide	4		0%			2.89
Methoxychlor	4		0%			29
Toxaphene	4		0%			289
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	4		0%			85
1,2-Dichlorobenzene	4		0%			85
1,3-Dichlorobenzene	4		0%			85
1,4-Dichlorobenzene	4		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	4		0%			85
2,4,5-Trichlorophenol	4		0%			210
2,4,6-Trichlorophenol	4		0%			85
2,4-Dichlorophenol	4		0%			85
2,4-Dimethylphenol	4		0%			85
2,4-Dinitrophenol	4		0%			210
2,4-Dinitrotoluene	4		0%			85
2,6-Dinitrotoluene	4		0%			85
2-Chloronaphthalene	4		0%			85
2-Chlorophenol	4		0%			85
2-Methyl-4,6-dinitrophenol	4		0%			210
2-Methylnaphthalene	4		0%			85
2-Methylphenol (o-cresol)	4		0%			85
2-Nitroaniline	4		0%			210
2-Nitrophenol	4		0%			85

Appendix C-3 2

Reference Area Largemouth Bass Data
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
3&4-Methylphenol (m&p-cresol)	4		0%			85
3,3'-Dichlorobenzidine	4		0%			85
3-Nitroaniline	4		0%			210
4-Bromophenylphenyl ether	4		0%			85
4-Chloro-3-methylphenol	4		0%			85
4-Chloroaniline	4		0%			85
4-Chlorophenylphenyl ether	4		0%			85
4-Nitroaniline	4		0%			210
4-Nitrophenol	4		0%			210
Acenaphthene	4		0%			85
Acenaphthylene	4		0%			85
Anthracene	4		0%			85
Benzo(a)anthracene	4		0%			85
Benzo(a)pyrene	4		0%			85
Benzo(b)fluoranthene	4		0%			85
Benzo(g,h,i)perylene	4		0%			85
Benzo(k)fluoranthene	4		0%			85
bis(2-Chloroethoxy)methane	4		0%			85
bis(2-Chloroethyl)ether	4		0%			85
bis(2-Ethylhexyl)phthalate	4		0%			85
Butylbenzylphthalate	4		0%			85
Carbazole	4		0%			85
Chrysene	4		0%			85
Di-n-butylphthalate	4	2	50%	19.00	20.00	52
Di-n-octylphthalate	4		0%			85
Dibenzo(a,h)anthracene	4		0%			85
Dibenzofuran	4		0%			85
Diethylphthalate	4		0%			85
Dimethylphthalate	4		0%			85
Fluoranthene	4		0%			85
Fluorene	4		0%			85
Hexachlorobenzene	4		0%			85
Hexachlorobutadiene	4		0%			85
Hexachlorocyclopentadiene	4		0%			85
Hexachloroethane	4		0%			85
Indeno(1,2,3-cd)pyrene	4		0%			85
Isophorone	4		0%			85
n-Nitrosodi-n-propylamine	4		0%			85
N-Nitrosodiphenylamine/Diphenylamine	4		0%			85
Naphthalene	4		0%			85
Nitrobenzene	4		0%			85
Pentachlorophenol	4		0%			210
Phenanthrene	4		0%			85
Phenol	4		0%			85
Pyrene	4		0%			85
Total PAHs						
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	4	4	100%	5.50E-03	1.23E-02	9.73E-03
1,2,3,4,6,7,8,9-OCDF	4		0%			5.38E-04
1,2,3,4,6,7,8-HpCDD	4		0%			4.25E-04
1,2,3,4,6,7,8-HpCDF	4		0%			2.38E-04
1,2,3,4,7,8,9-HpCDF	4		0%			3.88E-04
1,2,3,4,7,8-HxCDD	4		0%			2.88E-04
1,2,3,4,7,8-HxCDF	4	3	75%	8.40E-04	1.10E-03	7.85E-04
1,2,3,6,7,8-HxCDD	4		0%			2.38E-04
1,2,3,6,7,8-HxCDF	4		0%			1.63E-04
1,2,3,7,8,9-HxCDD	4		0%			3.13E-04
1,2,3,7,8,9-HxCDF	4		0%			2.38E-04
1,2,3,7,8-PeCDD	4		0%			3.25E-04
1,2,3,7,8-PeCDF	4		0%			1.88E-04
2,3,4,6,7,8-HxCDF	4		0%			2.00E-04
2,3,4,7,8-PeCDF	4		0%			1.88E-04
2,3,7,8-TCDD	4		0%			2.25E-04
2,3,7,8-TCDF	4	1	25%	1.60E-03	1.60E-03	5.38E-04
Total HpCDD	4		0%			4.25E-04
Total HpCDF	4		0%			1.86E-03
Total HxCDD	4		0%			2.88E-04
Total HxCDF	4		0%			9.61E-03
Total PeCDD	4		0%			3.25E-04
Total PeCDF	4		0%			1.61E-02
Total TCDD	4		0%			2.25E-04
Total TCDF	4		0%			1.98E-02

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.3

Brown Bullhead Data Summary for Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			5.00
2,4,5-TP (Silvex)	3		0%			5.00
2,4-D	3		0%			5.00
2,4-DB	3		0%			5.00
Dalapon	3		0%			1000
Dicamba	3		0%			8.33
Dichloroprop	3	1	33%	6.6	6.6	36
Dinoseb	3		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	3		0%			1000
MCPP[2-(4-chloro-2-methylphenoxy)-propan	3		0%			1000
Pentachlorophenol	3		0%			10
Metals, mg/kg						
Aluminum	3	3	100%	7.7	18	13
Antimony	3		0%			0.09
Arsenic	3		0%			1.43
Beryllium	3		0%			0.47
Cadmium	3		0%			0.23
Chromium	3	3	100%	0.27	0.70	0.42
Copper	3	3	100%	0.79	0.89	0.84
Cyanide, Total	3		0%			5.00
Lead	3	1	33%	0.25	0.25	0.24
Mercury	3	3	100%	0.05	0.26	0.13
Nickel	3		0%			4.70
Selenium	3		0%			0.23
Silver	3		0%			0.05
Zinc	3	3	100%	18	22	20
% Lipids	3	3	100%	0.30	1.70	1.13
PCB, ug/kg						
Decachlorobiphenyl	3		0%			25
Dichlorobiphenyl	3		0%			5.00
Heptachlorobiphenyl	3		0%			15
Hexachlorobiphenyl	3	2	67%	43	52	35
Monochlorobiphenyl	3		0%			5.00
Nonachlorobiphenyl	3		0%			25
Octachlorobiphenyl	3		0%			15
Pentachlorobiphenyl	3	2	67%	33	52	32
Tetrachlorobiphenyl	3		0%			10
Trichlorobiphenyl	3		0%			5.00
Total PCBs	3	2	67%	76	104	63
Pesticides, ug/kg						
4,4'-DDD	3		0%			8.67
4,4'-DDE	3	3	100%	3.4	29	18
4,4'-DDT	3		0%			8.67
Total DDT	3	3	100%	3	29	18
Aldrin	3		0%			4.60
Alpha Chlordane	3	1	33%	12	12	7.47
alpha-BHC	3		0%			4.60
beta-BHC	3		0%			4.60
delta-BHC	3		0%			4.60
Dieldrin	3		0%			8.67
Endosulfan I	3		0%			4.60
Endosulfan II	3		0%			8.67
Endosulfan sulfate	3		0%			8.67
Endrin	3		0%			8.67
Endrin aldehyde	3		0%			8.67
Endrin ketone	3		0%			8.67
Gamma Chlordane	3	1	33%	11	11	7.13
gamma-BHC (Lindane)	3		0%			4.60
Heptachlor	3	1	33%	2.8	2.8	3.20
Heptachlor epoxide	3		0%			4.60
Methoxychlor	3		0%			46
Toxaphene	3		0%			347
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			85
1,2-Dichlorobenzene	3		0%			85
1,3-Dichlorobenzene	3		0%			85
1,4-Dichlorobenzene	3		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	3		0%			85
2,4,5-Trichlorophenol	3		0%			210
2,4,6-Trichlorophenol	3		0%			85
2,4-Dichlorophenol	3		0%			85
2,4-Dimethylphenol	3		0%			85
2,4-Dinitrophenol	3		0%			210
2,4-Dinitrotoluene	3		0%			85
2,6-Dinitrotoluene	3		0%			85
2-Chloronaphthalene	3		0%			85
2-Chlorophenol	3		0%			85
2-Methyl-4,6-dinitrophenol	3		0%			210
2-Methylnaphthalene	3		0%			85

Brown Bullhead Data Summary for Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
2-Methylphenol (o-cresol)	3		0%			85
2-Nitroaniline	3		0%			210
2-Nitrophenol	3		0%			85
3&4-Methylphenol (m&p-cresol)	3		0%			85
3,3'-Dichlorobenzidine	3		0%			85
3-Nitroaniline	3		0%			210
4-Bromophenylphenyl ether	3		0%			85
4-Chloro-3-methylphenol	3		0%			85
4-Chloroaniline	3		0%			85
4-Chlorophenylphenyl ether	3		0%			85
4-Nitroaniline	3		0%			210
4-Nitrophenol	3		0%			210
Acenaphthene	3		0%			85
Acenaphthylene	3		0%			85
Anthracene	3		0%			85
Benzo(a)anthracene	3		0%			85
Benzo(a)pyrene	3		0%			85
Benzo(b)fluoranthene	3		0%			85
Benzo(g,h,i)perylene	3		0%			85
Benzo(k)fluoranthene	3		0%			85
bis(2-Chloroethoxy)methane	3		0%			85
bis(2-Chloroethyl)ether	3		0%			85
bis(2-Ethylhexyl)phthalate	3	1	33%	97	97	89
Butylbenzylphthalate	3		0%			85
Carbazole	3		0%			85
Chrysene	3		0%			85
Di-n-butylphthalate	3		0%			85
Di-n-octylphthalate	3		0%			85
Dibenzo(a,h)anthracene	3		0%			85
Dibenzofuran	3		0%			85
Diethylphthalate	3	1	33%	18	18	63
Dimethylphthalate	3		0%			85
Fluoranthene	3		0%			85
Fluorene	3		0%			85
Hexachlorobenzene	3		0%			85
Hexachlorobutadiene	3		0%			85
Hexachlorocyclopentadiene	3		0%			85
Hexachloroethane	3		0%			85
Indeno(1,2,3-cd)pyrene	3		0%			85
Isophorone	3		0%			85
n-Nitrosodi-n-propylamine	3		0%			85
N-Nitrosodiphenylamine/Diphenylamine	3		0%			85
Naphthalene	3		0%			85
Nitrobenzene	3		0%			127
Pentachlorophenol	3		0%			168
Phenanthrene	3		0%			85
Phenol	3		0%			85
Pyrene	2		0%			85
Total PAHs	3		0%			85
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	1.02E-02	1.15E-02	1.09E-02
1,2,3,4,6,7,8,9-OCDF	3	3	100%	6.55E-04	1.20E-03	8.72E-04
1,2,3,4,6,7,8-HpCDD	3	3	100%	1.50E-03	3.00E-03	2.23E-03
1,2,3,4,6,7,8-HpCDF	3	1	33%	5.45E-04	5.45E-04	3.82E-04
1,2,3,4,7,8,9-HpCDF	3		0%			3.08E-04
1,2,3,4,7,8-HxCDD	3	1	33%	1.80E-04	1.80E-04	2.60E-04
1,2,3,4,7,8-HxCDF	3	3	100%	5.90E-04	1.40E-03	9.85E-04
1,2,3,6,7,8-HxCDD	3	3	100%	7.80E-04	2.40E-03	1.53E-03
1,2,3,6,7,8-HxCDF	3	1	33%	2.45E-04	2.45E-04	2.32E-04
1,2,3,7,8,9-HxCDD	3		0%			2.50E-04
1,2,3,7,8,9-HxCDF	3	1	33%	6.90E-04	6.90E-04	4.13E-04
1,2,3,7,8-PeCDD	3	3	100%	4.20E-04	1.10E-03	7.97E-04
1,2,3,7,8-PeCDF	3		0%			1.58E-04
2,3,4,6,7,8-HxCDF	3	2	67%	1.60E-04	3.20E-04	2.93E-04
2,3,4,7,8-PeCDF	3	3	100%	7.70E-04	1.60E-03	1.31E-03
2,3,7,8-TCDD	3	2	67%	3.30E-04	8.35E-04	5.55E-04
2,3,7,8-TCDF	3	3	100%	1.20E-03	4.00E-03	2.83E-03
2,3,7,8-TCDF	3	3	100%	1.60E-03	4.10E-03	2.98E-03
Total HpCDD	3	3	100%	2.00E-03	3.00E-03	2.52E-03
Total HpCDF	3	3	100%	1.80E-03	5.10E-03	3.92E-03
Total HxCDD	3	3	100%	7.80E-04	2.40E-03	1.58E-03
Total HxCDF	3	3	100%	1.06E-02	3.80E-02	2.44E-02
Total PeCDD	3	3	100%	4.20E-04	1.18E-03	9.00E-04
Total PeCDF	3	3	100%	1.87E-02	4.91E-02	3.66E-02
Total TCDD	3	2	67%	3.30E-04	1.20E-03	6.77E-04
Total TCDF	3	3	100%	2.20E-02	5.30E-02	4.07E-02

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Reference Area Brown Bullhead Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			6.67
2,4,5-TP (Silvex)	3		0%			6.67
2,4-D	3		0%			6.67
2,4-DB	3		0%			6.67
Dalapon	3		0%			1333
Dicamba	3		0%			13
Dichloroprop	3		0%			67
Dinoseb	3		0%			67
MCPA[(4-chloro-2-methylphenoxy)-acetic a	3	1	33%	8600	8600	3533
MCPP[2-(4-chloro-2-methylphenoxy)-propan	3		0%			1333
Pentachlorophenol	3		0%			13
Metals, mg/kg						
Aluminum	3	3	100%	5.9	66	34
Antimony	3		0%			0.09
Arsenic	3		0%			1.20
Beryllium	3		0%			0.46
Cadmium	3		0%			0.23
Chromium	3	3	100%	0.34	0.48	0.41
Copper	3	3	100%	1.00	1.10	1.07
Cyanide, Total	3		0%			5.00
Lead	3	2	67%	0.18	0.23	0.21
Mercury	3	3	100%	0.05	0.10	0.08
Nickel	3		0%			4.55
Selenium	3	2	67%	0.48	0.50	0.40
Silver	3		0%			0.05
Zinc	3	3	100%	16	24	20
% Lipids	3	3	100%	1.00	1.40	1.13
PCB, ug/kg						
Decachlorobiphenyl	3		0%			25
Dichlorobiphenyl	3		0%			5.00
Heptachlorobiphenyl	3		0%			15
Hexachlorobiphenyl	3		0%			10
Monochlorobiphenyl	3		0%			5.00
Nonachlorobiphenyl	3		0%			25
Octachlorobiphenyl	3		0%			15
Pentachlorobiphenyl	3		0%			10
Tetrachlorobiphenyl	3		0%			10
Trichlorobiphenyl	3		0%			5.00
Total PCBs	3		0%			20
Pesticides, ug/kg						
4,4'-DDD	3	2	67%	1.2	2	5.33
4,4'-DDE	3	3	100%	4.7	12	8.83
4,4'-DDT	3		0%			8.67
Aldrin	3		0%			4.60
Alpha Chlordane	3	3	100%	1.1	2.5	1.57
alpha-BHC	3		0%			4.60
beta-BHC	3		0%			4.60
delta-BHC	3		0%			4.60
Dieldrin	3	3	100%	1.7	3.8	2.77
Endosulfan I	3		0%			4.60
Endosulfan II	3		0%			6.67
Endosulfan sulfate	3		0%			8.67
Endrin	3	1	33%	2.6	2.6	7.37
Endrin aldehyde	3		0%			8.67
Endrin ketone	3		0%			7.63
Gamma Chlordane	3	2	67%	6.1	6.2	6.43
gamma-BHC (Lindane)	3	2	67%	0.94	1.2	3.05
Heptachlor	3		0%			4.60
Heptachlor epoxide	3		0%			4.60
Methoxychlor	3		0%			46
Toxaphene	3		0%			347
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			85
1,2-Dichlorobenzene	3		0%			85
1,3-Dichlorobenzene	3		0%			85
1,4-Dichlorobenzene	3		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	3		0%			85
2,4,5-Trichlorophenol	3		0%			210
2,4,6-Trichlorophenol	3		0%			85
2,4-Dichlorophenol	3		0%			85
2,4-Dimethylphenol	3		0%			85
2,4-Dinitrophenol	3		0%			210
2,4-Dinitrotoluene	3		0%			85
2,6-Dinitrotoluene	3		0%			85
2-Chloronaphthalene	3		0%			85
2-Chlorophenol	3		0%			85
2-Methyl-4,6-dinitrophenol	3		0%			210
2-Methylnaphthalene	3		0%			85
2-Methylphenol (o-cresol)	3		0%			85
2-Nitroaniline	3		0%			210
2-Nitrophenol	3		0%			85

Reference Area Brown Bullhead Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
3&4-Methylphenol (m&p-cresol)	3		0%			85
3,3'-Dichlorobenzidine	3		0%			85
3-Nitroaniline	3		0%			210
4-Bromophenylphenyl ether	3		0%			85
4-Chloro-3-methylphenol	3		0%			85
4-Chloroaniline	3		0%			85
4-Chlorophenylphenyl ether	3		0%			85
4-Nitroaniline	3		0%			210
4-Nitrophenol	3		0%			210
Acenaphthene	3		0%			85
Acenaphthylene	3		0%			85
Anthracene	3		0%			85
Benzo(a)anthracene	3		0%			85
Benzo(a)pyrene	3		0%			85
Benzo(b)fluoranthene	3		0%			85
Benzo(g,h,i)perylene	3		0%			85
Benzo(k)fluoranthene	3		0%			85
bis(2-Chloroethoxy)methane	3		0%			85
bis(2-Chloroethyl)ether	3		0%			85
bis(2-Ethylhexyl)phthalate	3	2	67%	46	47	59
Butylbenzylphthalate	3		0%			85
Carbazole	3		0%			85
Chrysene	3		0%			85
Di-n-butylphthalate	3		0%			85
Di-n-octylphthalate	3		0%			85
Dibenzo(a,h)anthracene	3		0%			85
Dibenzofuran	3		0%			85
Diethylphthalate	3	1	33%	25	25	65
Dimethylphthalate	3		0%			85
Fluoranthene	3		0%			85
Fluorene	3		0%			85
Hexachlorobenzene	3		0%			85
Hexachlorobutadiene	3		0%			85
Hexachlorocyclopentadiene	3		0%			85
Hexachloroethane	3		0%			85
Indeno(1,2,3-cd)pyrene	3		0%			85
Isophorone	3		0%			85
n-Nitrosodi-n-propylamine	3		0%			85
N-Nitrosodiphenylamine/Diphenylamine	3		0%			85
Naphthalene	3		0%			85
Nitrobenzene	3		0%			127
Pentachlorophenol	3		0%			168
Phenanthrene	3		0%			85
Phenol	3		0%			85
Pyrene	2		0%			85
Total PAHs						
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	2.70E-03	2.08E-02	1.47E-02
1,2,3,4,6,7,8,9-OCDF	3	2	67%	5.20E-04	1.60E-03	8.40E-04
1,2,3,4,6,7,8-HpCDD	3	3	100%	8.10E-04	3.00E-03	1.87E-03
1,2,3,4,6,7,8-HpCDF	3		0%			1.67E-04
1,2,3,4,7,8,9-HpCDF	3		0%			2.00E-04
1,2,3,4,7,8-HxCDD	3		0%			1.67E-04
1,2,3,4,7,8-HxCDF	3	3	100%	2.60E-04	4.90E-04	4.10E-04
1,2,3,6,7,8-HxCDD	3	3	100%	3.90E-04	1.20E-03	7.37E-04
1,2,3,6,7,8-HxCDF	3		0%			1.17E-04
1,2,3,7,8,9-HxCDD	3		0%			1.67E-04
1,2,3,7,8,9-HxCDF	3		0%			1.33E-04
1,2,3,7,8-PeCDD	3		0%			1.83E-04
1,2,3,7,8-PeCDF	3		0%			1.17E-04
2,3,4,6,7,8-HxCDF	3		0%			1.17E-04
2,3,4,7,8-PeCDF	3	1	33%	3.30E-04	3.30E-04	1.77E-04
2,3,7,8-TCDD	3	2	67%	2.00E-04	4.20E-04	2.90E-04
2,3,7,8-TCDF	3	1	33%	7.50E-04	7.50E-04	3.17E-04
Total HpCDD	3	3	100%	8.10E-04	3.60E-03	3.43E-04
Total HpCDF	3	2	67%	1.30E-03	1.40E-03	9.33E-04
Total HxCDD	3	3	100%	3.90E-04	1.20E-03	7.37E-04
Total HxCDF	3	3	100%	3.30E-03	8.10E-03	6.33E-03
Total PeCDD	3		0%			1.83E-04
Total PeCDF	3	3	100%	9.70E-03	1.83E-02	1.44E-02
Total TCDD	3	3	100%	2.00E-04	9.30E-04	6.47E-04
Total TCDF	3	3	100%	8.50E-03	2.53E-02	1.62E-02

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Borrow Pit Lake Forage Fish Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T (ug/kg)	3		0%			6.67
2,4,5-TP (Silvex)	3		0%			6.67
2,4-D	3		0%			6.67
2,4-DB	3	2	67%	6.5	10	8.83
Dalapon	3		0%			1333
Dicamba	3	1	33%	2.6	2.6	11
Dichloroprop	3	1	33%	6.7	6.7	52
Dinoseb	3		0%			67
MCPA[(4-chloro-2-methylphenoxy)-acetic a	3	2	67%	3100	3300	2800
MCPP[2-(4-chloro-2-methylphenoxy)-propan	3		0%			1333
Pentachlorophenol	3	2	67%	1	2.2	7.73
Metals, mg/kg						
Aluminum	3	3	100%	24	52	40
Antimony	3		0%			0.09
Arsenic	3		0%			1.33
Beryllium	3		0%			0.47
Cadmium	3		0%			0.23
Chromium	3	3	100%	0.26	0.32	0.29
Copper	3	3	100%	0.5	1.7	0.99
Cyanide, Total	3		0%			5.00
Lead	3	1	33%	0.59	0.59	0.36
Mercury	3	2	67%	0.052	0.6	0.23
Nickel	3		0%			4.70
Selenium	3	2	67%	0.53	0.54	0.44
Silver	3		0%			0.05
Zinc	3	3	100%	24	33	30
% Lipids	3	3	100%	1.5	1.8	1.63
PCB, ug/kg						
Decachlorobiphenyl	3		0%			42
Dichlorobiphenyl	3		0%			8.33
Heptachlorobiphenyl	3		0%			25
Hexachlorobiphenyl	3	2	67%	19	22	20
Monochlorobiphenyl	3		0%			8.33
Nonachlorobiphenyl	3		0%			42
Octachlorobiphenyl	3		0%			25
Pentachlorobiphenyl	3	1	33%	8.7	8.7	16
Tetrachlorobiphenyl	3		0%			17
Trichlorobiphenyl	3		0%			8.33
Total PCBs	3	2	67%	31	39	30
Pesticides, ug/kg						
4,4'-DDD	3		0%			8.8
4,4'-DDE	3	3	100%	4.1	10	7.73
4,4'-DDT	3		0%			8.83
Total DDT	3	3	100%	4.1	10	7.73
Aldrin	3		0%			4.47
Alpha Chlordane	3		0%			4.47
alpha-BHC	3		0%			4.47
beta-BHC	3		0%			4.47
delta-BHC	3		0%			4.47
Dieldrin	3		0%			8.83
Endosulfan I	3		0%			4.47
Endosulfan II	3		0%			8.83
Endosulfan sulfate	3		0%			8.83
Endrin	3		0%			8.83
Endrin aldehyde	3		0%			8.83
Endrin ketone	3		0%			8.83
Gamma Chlordane	3		0%			4.47
gamma-BHC (Lindane)	3		0%			4.47
Heptachlor	3		0%			4.47
Heptachlor epoxide	3		0%			4.47
Methoxychlor	3		0%			45
Toxaphene	3		0%			447
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			142
1,2-Dichlorobenzene	3		0%			142
1,3-Dichlorobenzene	3		0%			142
1,4-Dichlorobenzene	3		0%			142
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	3		0%			142
2,4,5-Trichlorophenol	3		0%			350
2,4,6-Trichlorophenol	3		0%			142
2,4-Dichlorophenol	3		0%			142
2,4-Dimethylphenol	3		0%			142
2,4-Dinitrophenol	*3*		*0%*			*350*
2,4-Dinitrotoluene	3		0%			142
2,6-Dinitrotoluene	3		0%			142
2-Chloronaphthalene	3		0%			142
2-Chlorophenol	3		0%			142
2-Methyl-4,6-dinitrophenol	3		0%			350
2-Methylnaphthalene	3		0%			142

Borrow Pit Lake Forage Fish Data Summary
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
2-Methylphenol (o-cresol)	3		0%			142
2-Nitroaniline	3		0%			350
2-Nitrophenol	3		0%			142
3&4-Methylphenol (m&p-cresol)	3		0%			142
3,3'-Dichlorobenzidine	3		0%			142
3-Nitroaniline	3		0%			350
4-Bromophenylphenyl ether	3		0%			142
4-Chloro-3-methylphenol	3		0%			142
4-Chloroaniline	3		0%			142
4-Chlorophenylphenyl ether	3		0%			142
4-Nitroaniline	3		0%			350
4-Nitrophenol	3		0%			350
Acenaphthene	3		0%			142
Acenaphthylene	3		0%			142
Anthracene	3		0%			142
Benzo(a)anthracene	3		0%			142
Benzo(a)pyrene	3		0%			142
Benzo(b)fluoranthene	3		0%			142
Benzo(g,h,i)perylene	3		0%			142
Benzo(k)fluoranthene	3		0%			142
bis(2-Chloroethoxy)methane	3		0%			142
bis(2-Chloroethyl)ether	3		0%			142
bis(2-Ethylhexyl)phthalate	3	2	67%	150	230	183
Butylbenzylphthalate	3		0%			142
Carbazole	3		0%			142
Chrysene	3		0%			142
Di-n-butylphthalate	3		0%			142
Di-n-octylphthalate	3		0%			142
Dibenzo(a,h)anthracene	3	1	33%	48	48	101
Dibenzofuran	3		0%			142
Diethylphthalate	3	3	100%	19	37	31
Dimethylphthalate	3		0%			142
Fluoranthene	3		0%			142
Fluorene	3		0%			142
Hexachlorobenzene	3		0%			142
Hexachlorobutadiene	3		0%			142
Hexachlorocyclopentadiene	3		0%			142
Hexachloroethane	3		0%			142
Indeno(1,2,3-cd)pyrene	3	1	33%	54	54	103
Isophorone	3		0%			142
n-Nitrosodi-n-propylamine	3		0%			142
N-Nitrosodiphenylamine/Diphenylamine	3		0%			142
Naphthalene	3		0%			142
Nitrobenzene	3		0%			142
Pentachlorophenol	3		0%			350
Phenanthrene	3		0%			142
Phenol	3		0%			142
Pyrene	3		0%			142
Total PAHs	3	1	33%	102	102	357
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	8.90E-03	2.69E-02	1.99E-02
1,2,3,4,6,7,8,9-OCDF	3	2	67%	1.30E-03	4.40E-03	2.08E-03
1,2,3,4,6,7,8-HpCDD	3	3	100%	1.20E-03	1.80E-03	1.53E-03
1,2,3,4,6,7,8-HpCDF	3	1	33%	1.00E-03	1.00E-03	4.83E-04
1,2,3,4,7,8,9-HpCDF	3	1	33%	5.80E-04	5.80E-04	4.43E-04
1,2,3,4,7,8-HxCDD	3		0%			2.00E-04
1,2,3,4,7,8-HxCDF	3	2	67%	4.10E-04	7.70E-04	4.60E-04
1,2,3,6,7,8-HxCDD	3	1	33%	6.00E-04	6.00E-04	3.50E-04
1,2,3,6,7,8-HxCDF	3		0%			1.17E-04
1,2,3,7,8,9-HxCDD	3		0%			2.17E-04
1,2,3,7,8,9-HxCDF	3		0%			1.83E-04
1,2,3,7,8-PeCDD	3		0%			2.17E-04
1,2,3,7,8-PeCDF	3		0%			1.33E-04
2,3,4,6,7,8-HxCDF	3		0%			1.33E-04
2,3,4,7,8-PeCDF	3	1	33%	4.60E-04	4.60E-04	2.70E-04
2,3,7,8-TCDD	3	1	33%	7.20E-04	7.20E-04	3.90E-04
2,3,7,8-TCDF	3	3	100%	4.00E-03	7.25E-03	5.22E-03
Total HpCDD	3	3	100%	1.20E-03	2.80E-03	2.20E-03
Total HpCDF	3	3	100%	1.80E-03	6.70E-03	3.50E-03
Total HxCDD	3	1	33%	6.00E-04	6.00E-04	3.67E-04
Total HxCDF	3	3	100%	7.20E-03	1.36E-02	9.37E-03
Total PeCDD	3		0%			2.17E-04
Total PeCDF	3	3	100%	8.50E-03	1.89E-02	1.27E-02
Total TCDD	3	1	33%	7.20E-04	7.20E-04	3.90E-04
Total TCDF	3	3	100%	1.41E-02	2.50E-02	1.78E-02

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Reference Area Forage Fish
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			5.00
2,4,5-TP (Silvex)	3		0%			5.00
2,4-D	3		0%			5.00
2,4-DB	3	1	33%	10	10	6.7
Dalapon	3		0%			1000
Dicamba	3		0%			10
Dichloroprop	3	1	33%	5.1	5.1	35
Dinoseb	3		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	3	1	33%	2400	2400	1467
MCPP[2-(4-chloro-2-methylphenoxy)-propan	3		0%			1000
Pentachlorophenol	3	1	33%	2.2	2.2	5.2
Metals, mg/kg						
Aluminum	3	3	100%	8.3	80	34
Antimony	3		0%			0.09
Arsenic	3		0%			1.47
Beryllium	3		0%			0.47
Cadmium	3		0%			0.23
Chromium	3	3	100%	0.24	1.7	0.79
Copper	3	3	100%	0.42	0.54	0.47
Cyanide, Total	3		0%			5.00
Lead	3		0%			0.23
Mercury	3	3	100%	0.046	0.051	0.049
Nickel	3		0%			4.70
Selenium	3	1	33%	0.56	0.56	0.35
Silver	3		0%			0.05
Zinc	3	3	100%	17	33	25
% Lipids	3	3	100%	1	2.6	1.8
PCB, ug/kg						
Decachlorobiphenyl	3		0%			42
Dichlorobiphenyl	3		0%			8.33
Heptachlorobiphenyl	3		0%			25
Hexachlorobiphenyl	3		0%			17
Monochlorobiphenyl	3		0%			8.33
Nonachlorobiphenyl	3		0%			42
Octachlorobiphenyl	3		0%			25
Pentachlorobiphenyl	3		0%			17
Tetrachlorobiphenyl	3		0%			17
Trichlorobiphenyl	3		0%			8.33
Total PCBs						
Pesticides, ug/kg						
4,4'-DDD	2		0%			8.25
4,4'-DDE	2	1	50%	3.5	3.5	6.8
4,4'-DDT	2		0%			8.25
Aldrin	2		0%			4.20
Alpha Chlordane	2		0%			4.20
alpha-BHC	2		0%			4.20
beta-BHC	2		0%			4.20
delta-BHC	2		0%			4.20
Dieldrin	2	1	50%	4.7	4.7	7.4
Endosulfan I	2		0%			4.20
Endosulfan II	2		0%			8.25
Endosulfan sulfate	2		0%			8.25
Endrin	2		0%			8.25
Endrin aldehyde	2		0%			8.25
Endrin ketone	2		0%			8.25
Gamma Chlordane	2		0%			6.7
gamma-BHC (Lindane)	2		0%			4.20
Heptachlor	2		0%			4.20
Heptachlor epoxide	2		0%			4.20
Methoxychlor	2		0%			42
Toxaphene	2		0%			420
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			85
1,2-Dichlorobenzene	3		0%			85
1,3-Dichlorobenzene	3		0%			85
1,4-Dichlorobenzene	3		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	3		0%			85
2,4,5-Trichlorophenol	3		0%			210
2,4,6-Trichlorophenol	3		0%			85
2,4-Dichlorophenol	3		0%			85
2,4-Dimethylphenol	3		0%			85
2,4-Dinitrophenol	3		0%			210
2,4-Dinitrotoluene	3		0%			85
2,6-Dinitrotoluene	3		0%			85
2-Chloronaphthalene	3		0%			85
2-Chlorophenol	3		0%			85
2-Methyl-4,6-dinitrophenol	3		0%			210
2-Methylnaphthalene	3		0%			85
2-Methylphenol (o-cresol)	3		0%			85

Reference Area Forage Fish
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
2-Nitroaniline	3		0%			210
2-Nitrophenol	3		0%			85
3&4-Methylphenol (m&p-cresol)	3		0%			85
3,3'-Dichlorobenzidine	3		0%			85
3-Nitroaniline	3		0%			210
4-Bromophenylphenyl ether	3		0%			85
4-Chloro-3-methylphenol	3		0%			85
4-Chloroaniline	3		0%			85
4-Chlorophenylphenyl ether	3		0%			85
4-Nitroaniline	3		0%			210
4-Nitrophenol	3		0%			210
Acenaphthene	3		0%			85
Acenaphthylene	3		0%			85
Anthracene	3		0%			85
Benzo(a)anthracene	3		0%			85
Benzo(a)pyrene	3		0%			85
Benzo(b)fluoranthene	3		0%			85
Benzo(g,h,i)perylene	3		0%			85
Benzo(k)fluoranthene	3		0%			85
bis(2-Chloroethoxy)methane	3		0%			85
bis(2-Chloroethyl)ether	3		0%			85
bis(2-Ethylhexyl)phthalate	3	3	100%	140	280	197
Butylbenzylphthalate	3		0%			85
Carbazole	2		0%			85
Chrysene	3		0%			85
Di-n-butylphthalate	3		0%			85
Di-n-octylphthalate	3		0%			85
Dibenzo(a,h)anthracene	3		0%			85
Dibenzofuran	3		0%			85
Diethylphthalate	3	3	100%	18	37	25
Dimethylphthalate	3		0%			85
Fluoranthene	3		0%			85
Fluorene	3		0%			85
Hexachlorobenzene	3		0%			85
Hexachlorobutadiene	3		0%			85
Hexachlorocyclopentadiene	3		0%			85
Hexachloroethane	3		0%			85
Indeno(1,2,3-cd)pyrene	3		0%			85
Isophorone	3		0%			85
n-Nitrosodi-n-propylamine	3		0%			85
N-Nitrosodiphenylamine/Diphenylamine	3		0%			85
Naphthalene	3		0%			85
Nitrobenzene	3		0%			85
Pentachlorophenol	3		0%			210
Phenanthrene	3		0%			85
Phenol	3		0%			85
Pyrene	3		0%			85
Total PAHs						
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	2.23E-02	6.80E-02	4.76E-02
1,2,3,4,6,7,8,9-OCDF	3	2	67%	1.60E-03	1.80E-02	6.63E-03
1,2,3,4,6,7,8-HpCDD	3	3	100%	1.80E-03	4.70E-03	3.57E-03
1,2,3,4,6,7,8-HpCDF	3	1	33%	1.60E-03	1.60E-03	6.17E-04
1,2,3,4,7,8,9-HpCDF	3		0%			2.50E-04
1,2,3,4,7,8-HxCDD	3		0%			1.83E-04
1,2,3,4,7,8-HxCDF	3	3	100%	2.30E-04	5.70E-04	4.00E-04
1,2,3,6,7,8-HxCDD	3	3	100%	4.40E-04	6.60E-04	5.60E-04
1,2,3,6,7,8-HxCDF	3		0%			1.17E-04
1,2,3,7,8,9-HxCDD	3		0%			2.00E-04
1,2,3,7,8,9-HxCDF	3		0%			1.50E-04
1,2,3,7,8-PeCDD	3	1	33%	9.50E-04	9.50E-04	4.17E-04
1,2,3,7,8-PeCDF	3		0%			1.33E-04
2,3,4,6,7,8-HxCDF	3		0%			1.33E-04
2,3,4,7,8-PeCDF	3		0%			1.50E-04
2,3,7,8-TCDD	3	3	100%	4.60E-04	8.60E-04	6.00E-04
2,3,7,8-TCDF	3	3	100%	9.50E-04	2.90E-03	3.01E-04

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.7

Combined Summary Statistics for Largemouth Bass and Brown Bullhead
Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T (ug/kg)	6		0%			5.00
2,4,5-TP (Silvex)	6		0%			5.00
2,4-D	6		0%			5.00
2,4-DB	6		0%			5.00
Dalapon	6		0%			1000
Dicamba	6	1	17%	1.90	1.90	6.98
Dichloroprop	6	1	17%	6.60	6.60	43
Dinoseb	6		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	6	1	17%	1,800.00	1,800.00	1133
MCPP[2-(4-chloro-2-methylphenoxy)-propan	6		0%			1000
Pentachlorophenol	6		0%			8.33
Metals, mg/kg						
Aluminum	6	5	83%	7.70	33.00	16
Antimony	6		0%			0.09
Arsenic	6		0%			2.30
Beryllium	6		0%			0.47
Cadmium	6		0%			0.23
Chromium	6	6	100%	0.27	0.93	0.53
Copper	6	6	100%	0.41	0.89	0.69
Cyanide, Total	6		0%			5.0
Lead	6	1	17%	0.25	0.25	0.24
Mercury	6	5	83%	0.050	0.26	0.086
Nickel	6		0%			4.7
Selenium	6	2	33%	0.60	0.63	0.36
Silver	6		0%			0.048
Zinc	6	6	100%	15	22	18
% Lipid	6	6	100%	0.30	1.8	1.4
PCB, ug/kg						
Decachlorobiphenyl	6		0%			25
Dichlorobiphenyl	6		0%			5.0
Heptachlorobiphenyl	6	2	33%	16	21	16
Hexachlorobiphenyl	6	5	83%	43	150	70
Monochlorobiphenyl	6		0%			5.0
Nonachlorobiphenyl	6		0%			25
Octachlorobiphenyl	6		0%			15
Pentachlorobiphenyl	6	5	83%	30	130	61
Tetrachlorobiphenyl	6	2	33%	19	46	18
Trichlorobiphenyl	6		0%			5.0
Total PCBs	6	5	83%	76	320	150
Pesticides, ug/kg						
4,4'-DDD	6		0%			7.6
4,4'-DDE	6	5	83%	3.4	29	16
4,4'-DDT	6		0%			7.6
Total DDT	6	5	83%	3.4	29	16
Aldrin	6		0%			4.0
Alpha Chlordane	6	1	17%	12	12	5.4
alpha-BHC	6		0%			4.0
beta-BHC	6		0%			4.0
delta-BHC	6		0%			4.0
Dieldrin	6		0%			7.6
Endosulfan I	6		0%			4.0
Endosulfan II	6		0%			7.6
Endosulfan sulfate	6		0%			7.6
Endrin	6		0%			7.6
Endrin aldehyde	6		0%			7.6
Endrin ketone	6		0%			7.6
Gamma Chlordane	6	3	50%	11	19	9.8
gamma-BHC (Lindane)	6		0%			4.0
Heptachlor	6	2	33%	1.5	2.8	3.0
Heptachlor epoxide	6		0%			4.0
Methoxychlor	6		0%			40
Toxaphene	6		0%			343
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	6		0%			85
1,2-Dichlorobenzene	6		0%			85
1,3-Dichlorobenzene	6		0%			85
1,4-Dichlorobenzene	6		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	6		0%			85
2,4,5-Trichlorophenol	6		0%			210
2,4,6-Trichlorophenol	6		0%			85
2,4-Dichlorophenol	6		0%			85
2,4-Dimethylphenol	6		0%			85
2,4-Dinitrophenol	6		0%			210
2,4-Dinitrotoluene	6		0%			85
2,6-Dinitrotoluene	6		0%			85
2-Chloronaphthalene	6		0%			85
2-Chlorophenol	6		0%			85
2-Methyl-4,6-dinitrophenol	6		0%			210
2-Methylnaphthalene	6		0%			85

Combined Summary Statistics for Largemouth Bass and Brown Bullhead
Borrow Pit Lake
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
2-Methylphenol (o-cresol)	6		0%			85
2-Nitroaniline	6		0%			210
2-Nitrophenol	6		0%			85
3&4-Methylphenol (m&p-cresol)	6		0%			85
3,3'-Dichlorobenzidine	6		0%			85
3-Nitroaniline	6		0%			210
4-Bromophenylphenyl ether	6		0%			85
4-Chloro-3-methylphenol	6		0%			85
4-Chloroaniline	6		0%			85
4-Chlorophenylphenyl ether	6		0%			85
4-Nitroaniline	6		0%			210
4-Nitrophenol	6		0%			210
Acenaphthene	6		0%			85
Acenaphthylene	6		0%			85
Anthracene	6		0%			85
Benzo(a)anthracene	6		0%			85
Benzo(a)pyrene	6		0%			85
Benzo(b)fluoranthene	6		0%			85
Benzo(g,h,i)perylene	6		0%			85
Benzo(k)fluoranthene	6		0%			85
bis(2-Chloroethoxy)methane	6		0%			85
bis(2-Chloroethyl)ether	6		0%			85
bis(2-Ethylhexyl)phthalate	6	1	17%	97	97	90
Butylbenzylphthalate	6		0%			85
Carbazole	6		0%			85
Chrysene	6		0%			85
Di-n-butylphthalate	6	1	17%	32	32	76
Di-n-octylphthalate	6		0%			85
Dibenzo(a,h)anthracene	6		0%			85
Dibenzofuran	6		0%			85
Diethylphthalate	6	1	17%	18	18	74
Dimethylphthalate	6		0%			85
Fluoranthene	6		0%			85
Fluorene	6		0%			85
Hexachlorobenzene	6		0%			85
Hexachlorobutadiene	6		0%			85
Hexachlorocyclopentadiene	6		0%			85
Hexachloroethane	6		0%			85
Indeno(1,2,3-cd)pyrene	6		0%			85
Isophorone	6		0%			85
n-Nitrosodi-n-propylamine	6		0%			85
N-Nitrosodiphenylamine/Diphenylamine	6		0%			85
Naphthalene	6		0%			85
Nitrobenzene	6		0%			106
Pentachlorophenol	6		0%			189
Phenanthrene	6		0%			85
Phenol	6		0%			85
Pyrene	5		0%			85
Total PAHs	6		0%			85
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	6	3	50%	1.02E-02	1.15E-02	8.71E-03
1,2,3,4,6,7,8,9-OCDF	6	3	50%	6.55E-04	1.20E-03	9.61E-04
1,2,3,4,6,7,8-HpCDD	6	3	50%	1.50E-03	3.00E-03	1.55E-03
1,2,3,4,6,7,8-HpCDF	6	1	17%	5.45E-04	5.45E-04	2.41E-04
1,2,3,4,7,8,9-HpCDF	6		0%			2.38E-04
1,2,3,4,7,8-HxCDD	6	1	17%	1.80E-04	1.80E-04	2.05E-04
1,2,3,4,7,8-HxCDF	6	4	67%	4.80E-04	1.40E-03	6.14E-04
1,2,3,6,7,8-HxCDD	6	4	67%	5.40E-04	2.40E-03	9.10E-04
1,2,3,6,7,8-HxCDF	6	2	33%	2.30E-04	2.45E-04	1.88E-04
1,2,3,7,8,9-HxCDD	6		0%			1.92E-04
1,2,3,7,8,9-HxCDF	6	1	17%	6.90E-04	6.90E-04	2.57E-04
1,2,3,7,8-PeCDD	6	4	67%	4.20E-04	1.10E-03	6.49E-04
1,2,3,7,8-PeCDF	6	1	17%	1.10E-03	1.10E-03	2.78E-04
2,3,4,6,7,8-HxCDF	6	3	50%	1.60E-04	3.80E-04	2.52E-04
2,3,4,7,8-PeCDF	6	5	83%	7.10E-04	1.60E-03	9.85E-04
2,3,7,8-TCDD	6	4	67%	3.30E-04	9.00E-04	6.44E-04
2,3,7,8-TCDF	6	6	100%	1.20E-03	1.14E-02	6.05E-03
Total HpCDD	6	5	83%	1.40E-03	3.00E-03	1.98E-03
Total HpCDF	6	4	67%	1.80E-03	6.70E-03	4.14E-03
Total HxCDD	6	4	67%	5.40E-04	2.40E-03	1.03E-03
Total HxCDF	6	3	50%	1.06E-02	3.80E-02	2.06E-02
Total PeCDD	6	4	67%	4.20E-04	1.18E-03	7.01E-04
Total PeCDF	6	3	50%	1.87E-02	4.91E-02	2.79E-02
Total TCDD	6	3	50%	3.30E-04	1.20E-03	6.30E-04
Total TCDF	6	3	50%	2.20E-02	5.30E-02	3.56E-02

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Creek Sector F Plant Tissue Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T (ug/kg)	2		0%			5.0
2,4,5-TP (Silvex)	2		0%			5.0
2,4-D	2		0%			5.0
2,4-DB	2		0%			5.0
Dalapon	2		0%			1000
Dicamba	2		0%			10
Dichloroprop	2	1	50%	7	7	29
Dinoseb	2		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	2		0%			1000
MCPP[2-(4-chloro-2-methylphenoxy)-propan	2		0%			1000
Pentachlorophenol	2		0%			10
Metals, mg/kg						
Aluminum	2	2	100%	30	44	37
Antimony	2	1	50%	0.13	0.13	0.12
Arsenic	2	2	100%	0.42	0.56	0.49
Beryllium	2		0%			0.50
Cadmium	2	1	50%	0.097	0.097	0.17
Chromium	2		0%			0.25
Copper	2	2	100%	1.9	2.1	2.0
Cyanide, Total	2		0%			5.0
Lead	2	2	100%	0.44	1.2	0.82
Mercury	2		0%			0.0093
Nickel	2	2	100%	1.2	2.6	1.9
Selenium	2		0%			0.25
Silver	2		0%			0.044
Zinc	2	2	100%	20	26	23
PCBs and Pesticides, ug/kg						
Decachlorobiphenyl	2		0%			25
Dichlorobiphenyl	2		0%			5.0
Heptachlorobiphenyl	2		0%			15
Hexachlorobiphenyl	2		0%			10
Monochlorobiphenyl	2		0%			5.0
Nonachlorobiphenyl	2		0%			25
Octachlorobiphenyl	2		0%			15
Pentachlorobiphenyl	2		0%			10
Tetrachlorobiphenyl	2		0%			10
Trichlorobiphenyl	2		0%			5.0
Total PCBs	2		0%			15
4,4'-DDD (ug/kg)	2		0%			13
4,4'-DDE	2		0%			13
4,4'-DDT	2		0%			13
Total DDT	2		0%			13
Aldrin	*2*	*1*	*50%*	*0.81*	*0.81*	*3.9*
Alpha Chlordane	2		0%			7.0
alpha-BHC	2		0%			7.0
beta-BHC	2		0%			7.0
delta-BHC	2		0%			7.0
Dieldrin	2		0%			13
Endosulfan I	2		0%			7.0
Endosulfan II	2		0%			13
Endosulfan sulfate	2		0%			13
Endrin	2		0%			13
Endrin aldehyde	2		0%			13
Endrin ketone	2		0%			13
Gamma Chlordane	2	1	50%	3.1	3.1	5.1
gamma-BHC (Lindane)	2		0%			7.0
Heptachlor	2	2	100%	1.8	1.9	1.9
Heptachlor epoxide	2		0%			7.0
Methoxychlor	2		0%			70
Toxaphene	2		0%			360
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	2		0%			85
1,2-Dichlorobenzene	2		0%			85
1,3-Dichlorobenzene	2		0%			85
1,4-Dichlorobenzene	2		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	2		0%			85
2,4,5-Trichlorophenol	2		0%			210
2,4,6-Trichlorophenol	2		0%			85
2,4-Dichlorophenol (ug/kg)	2		0%			85
2,4-Dimethylphenol	2	1	50%	51	51	68
2,4-Dinitrophenol	2		0%			210
2,4-Dinitrotoluene	2		0%			85
2,6-Dinitrotoluene	2		0%			85
2-Chloronaphthalene	2		0%			85
2-Chlorophenol	2		0%			85
2-Methyl-4,6-dinitrophenol	2		0%			210
2-Methylnaphthalene	2		0%			85
2-Methylphenol (o-cresol)	2		0%			85
2-Nitroaniline	2		0%			210
2-Nitrophenol	2		0%			85

Creek Sector F Plant Tissue Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
3&4-Methylphenol (m&p-cresol)	2		0%			85
3,3'-Dichlorobenzidine	2		0%			85
3-Nitroaniline	2		0%			210
4-Bromophenylphenyl ether	2		0%			85
4-Chloro-3-methylphenol	2		0%			85
4-Chloroaniline	2		0%			85
4-Chlorophenylphenyl ether	2		0%			85
4-Nitroaniline	2		0%			210
4-Nitrophenol	2		0%			210
Acenaphthene	2		0%			85
Acenaphthylene	2	1	50%	32	32	59
Anthracene	2		0%			85
Benzo(a)anthracene	2		0%			85
Benzo(a)pyrene	2	1	50%	140	140	113
Benzo(b)fluoranthene	2	1	50%	59	59	72
Benzo(g,h,i)perylene	2	1	50%	360	360	223
Benzo(k)fluoranthene	2	1	50%	52	52	69
bis(2-Chloroethoxy)methane	2		0%			85
bis(2-Chloroethyl)ether	2		0%			85
bis(2-Ethylhexyl)phthalate	2		0%			85
Butylbenzylphthalate	2		0%			85
Chrysene	2		0%			85
Di-n-butylphthalate	2		0%			85
Di-n-octylphthalate	2		0%			85
Dibenzo(a,h)anthracene	2	1	50%	76	76	81
Dibenzofuran	2		0%			85
Diethylphthalate	2		0%			85
Dimethylphthalate	2		0%			85
Fluoranthene	2		0%			85
Fluorene	2		0%			85
Hexachlorobenzene	2		0%			85
Hexachlorobutadiene	2		0%			85
Hexachlorocyclopentadiene	2		0%			85
Hexachloroethane	2		0%			85
Indeno(1,2,3-cd)pyrene	2	1	50%	300	300	193
Isophorone	2		0%			85
n-Nitrosodi-n-propylamine	2		0%			85
N-Nitrosodiphenylamine/Diphenylamine	2		0%			85
Naphthalene	2		0%			85
Nitrobenzene	2		0%			85
Pentachlorophenol	2		0%			210
Phenanthrene	2		0%			85
Phenol	2		0%			85
Pyrene	2		0%			85
Total PAHs	2	1	50%	1019	1019	552
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	2	2	100%	5.69E-02	8.33E-02	7.01E-02
1,2,3,4,6,7,8,9-OCDF	2	2	100%	2.26E-02	3.35E-02	2.81E-02
1,2,3,4,6,7,8-HpCDD	2	2	100%	7.40E-03	1.16E-02	9.50E-03
1,2,3,4,6,7,8-HpCDF	2	2	100%	5.70E-03	7.40E-03	6.55E-03
1,2,3,4,7,8,9-HpCDF	2		0%			3.00E-04
1,2,3,4,7,8-HxCDD	2		0%			2.50E-04
1,2,3,4,7,8-HxCDF	2		0%			2.00E-04
1,2,3,6,7,8-HxCDD	2		0%			2.50E-04
1,2,3,6,7,8-HxCDF	2		0%			1.50E-04
1,2,3,7,8,9-HxCDD	2		0%			2.50E-04
1,2,3,7,8,9-HxCDF	2		0%			2.00E-04
1,2,3,7,8-PeCDD	2		0%			2.00E-04
1,2,3,7,8-PeCDF	2		0%			1.75E-04
2,3,4,6,7,8-HxCDF	2		0%			1.75E-04
2,3,4,7,8-PeCDF	2		0%			1.75E-04
2,3,7,8-TCDD	2		0%			2.25E-04
2,3,7,8-TCDF	2		0%			2.00E-04
2,3,7,8-TCDF						
Total HpCDD	2	2	100%	1.40E-02	2.11E-02	1.76E-02
Total HpCDF	2	2	100%	1.73E-02	2.56E-02	2.15E-02
Total HxCDD	2	2	100%	2.50E-03	3.20E-03	2.85E-03
Total HxCDF	2	2	100%	3.00E-03	6.40E-03	4.70E-03
Total PeCDD	2		0%			2.00E-04
Total PeCDF	2		0%			1.75E-04
Total TCDD	2	2	100%	2.80E-03	3.10E-03	2.95E-03
Total TCDF	2	1	50%	2.40E-03	2.40E-03	1.30E-03

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.9

Summary Statistics for Reference Plant Tissue Data
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentraton
Herbicides, ug/kg						
2,4,5-T	2		0%			5.0
2,4,5-TP (Silvex)	2		0%			5.0
2,4-D	2		0%			5.0
2,4-DB	2		0%			5.0
Dalapon	2		0%			1000
Dicamba	2	1	50%	1.8	1.8	5.9
Dichloroprop	2		0%			50
Dinoseb	2		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	2		0%			1000
MCPP[2-(4-chloro-2-methylphenoxy)-propan	2	1	50%	1300	1300	1150
Pentachlorophenol	2	1	50%	2	2	6.0
Metals, mg/kg						
Aluminum	2	2	100%	160	360	260
Antimony	2		0%			0.10
Arsenic	2	1	50%	1.1	1.1	0.78
Beryllium	2		0%			0.50
Cadmium	2		0%			0.25
Chromium	2	2	100%	0.25	0.53	0.39
Copper	2	2	100%	0.95	1.3	1.1
Cyanide, Total	2		0%			5.0
Lead	2	2	100%	0.3	0.64	0.47
Mercury	2		0%			0.01
Nickel	2		0%			5.0
Selenium	2		0%			0.25
Silver	2		0%			0.048
Zinc	2	2	100%	6.8	8.3	7.6
PCBs and Pesticides, ug/kg						
Decachlorobiphenyl	2		0%			25
Dichlorobiphenyl	2		0%			5.0
Heptachlorobiphenyl	2		0%			15
Hexachlorobiphenyl	2		0%			10
Monochlorobiphenyl	2		0%			5.0
Nonachlorobiphenyl	2		0%			25
Octachlorobiphenyl	2		0%			15
Pentachlorobiphenyl	2		0%			10
Tetrachlorobiphenyl	2		0%			10
Trichlorobiphenyl	2		0%			5.00
4,4'-DDD	2		0%			13
4,4'-DDE	2		0%			13
4,4'-DDT	2		0%			13
Aldrin	2	1	50%	1	1	4.0
Alpha Chlordane	2		0%			7.0
alpha-BHC	2		0%			7.0
beta-BHC	2		0%			7.0
delta-BHC	2		0%			7.0
Dieldrin	2		0%			13
Endosulfan I	2		0%			7.0
Endosulfan II	2		0%			13
Endosulfan sulfate	2		0%			13
Endrin	2		0%			13
Endrin aldehyde	2		0%			13
Endrin ketone	2		0%			13
Gamma Chlordane	2		0%			7.0
gamma-BHC (Lindane)	2		0%			7.0
Heptachlor	2	1	50%	3.8	3.8	5.4
Heptachlor epoxide	2		0%			7.0
Methoxychlor	2		0%			70
Toxaphene	2		0%			360
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	2		0%			85
1,2-Dichlorobenzene	2		0%			85
1,3-Dichlorobenzene	2		0%			85
1,4-Dichlorobenzene	2		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	2		0%			85
2,4,5-Trichlorophenol	2		0%			210
2,4,6-Trichlorophenol	2		0%			85
2,4-Dichlorophenol	2		0%			85
2,4-Dimethylphenol	2		0%			85
2,4-Dinitrophenol	2		0%			210
2,4-Dinitrotoluene	2		0%			85
2,6-Dinitrotoluene	2		0%			85
2-Chloronaphthalene	2		0%			85
2-Chlorophenol	2		0%			85
2-Methyl-4,6-dinitrophenol	2		0%			210
2-Methylnaphthalene	2		0%			85
2-Methylphenol (o-cresol)	2		0%			85
2-Nitroaniline	2		0%			210
2-Nitrophenol	2		0%			85
3&4-Methylphenol (m&p-cresol)	2		0%			85
3,3'-Dichlorobenzidine	2		0%			85

Summary Statistics for Reference Plant Tissue Data
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
3-Nitroaniline	2		0%			210
4-Bromophenylphenyl ether	2		0%			85
4-Chloro-3-methylphenol	2		0%			85
4-Chloroaniline	2		0%			85
4-Chlorophenylphenyl ether	2		0%			85
4-Nitroaniline	2		0%			210
4-Nitrophenol	2		0%			210
Acenaphthene	2		0%			85
Acenaphthylene	2		0%			85
Anthracene	2		0%			85
Benzo(a)anthracene	2		0%			85
Benzo(a)pyrene	2	2	100%	15	37	26
Benzo(b)fluoranthene	2	1	50%	16	16	51
Benzo(g,h,i)perylene	2	2	100%	240	390	315
Benzo(k)fluoranthene	2	1	50%	21	21	53
bis(2-Chloroethoxy)methane	2		0%			85
bis(2-Chloroethyl)ether	2		0%			85
bis(2-Ethylhexyl)phthalate	2		0%			85
Butylbenzylphthalate	2		0%			85
Chrysene	2		0%			85
Di-n-butylphthalate	2		0%			85
Di-n-octylphthalate	2		0%			85
Dibenzo(a,h)anthracene	2	2	100%	180	400	290
Dibenzofuran	2		0%			85
Diethylphthalate	2		0%			85
Dimethylphthalate	2		0%			85
Fluoranthene	2		0%			85
Fluorene	2		0%			85
Hexachlorobenzene	2		0%			85
Hexachlorobutadiene	2		0%			85
Hexachlorocyclopentadiene	2		0%			85
Hexachloroethane	2		0%			85
Indeno(1,2,3-cd)pyrene	2	2	100%	220	440	330
Isophorone	2		0%			85
n-Nitrosodi-n-propylamine	2		0%			85
N-Nitrosodiphenylamine/Diphenylamine	2		0%			85
Naphthalene	2		0%			85
Nitrobenzene	2		0%			85
Pentachlorophenol	2		0%			210
Phenanthrene	2		0%			85
Phenol	2		0%			85
Pyrene	2		0%			85
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	2	2	100%	8.32E-02	8.71E-02	8.52E-02
1,2,3,4,6,7,8,9-OCDF	2	2	100%	6.20E-04	8.50E-03	4.56E-03
1,2,3,4,6,7,8-HpCDD	2	2	100%	2.10E-03	6.10E-03	4.10E-03
1,2,3,4,6,7,8-HpCDF	2	1	50%	1.40E-03	1.40E-03	7.50E-04
1,2,3,4,7,8,9-HpCDF	2		0%			3.00E-04
1,2,3,4,7,8-HxCDD	2		0%			2.75E-04
1,2,3,4,7,8-HxCDF	2		0%			1.75E-04
1,2,3,6,7,8-HxCDD	2		0%			2.50E-04
1,2,3,6,7,8-HxCDF	2		0%			1.75E-04
1,2,3,7,8,9-HxCDD	2		0%			2.50E-04
1,2,3,7,8,9-HxCDF	2		0%			2.00E-04
1,2,3,7,8-PeCDD	2		0%			2.25E-04
1,2,3,7,8-PeCDF	2		0%			1.75E-04
2,3,4,6,7,8-HxCDF	2		0%			1.75E-04
2,3,4,7,8-PeCDF	2		0%			1.75E-04
2,3,7,8-TCDD	2		0%			2.25E-04
2,3,7,8-TCDF	2		0%			2.00E-04
2,3,7,8-TCDF						
Total HpCDD	2	2	100%	5.90E-03	1.27E-02	9.30E-03
Total HpCDF	2	1	50%	5.90E-03	5.90E-03	3.00E-03
Total HxCDD	2	1	50%	1.40E-03	1.40E-03	9.00E-04
Total HxCDF	2		0%			1.75E-04
Total PeCDD	2		0%			2.25E-04
Total PeCDF	2		0%			1.75E-04
Total TCDD	2		0%			2.25E-04
Total TCDF	2		0%			2.00E-04

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.10

Borrow Pit Lake Shrimp Tissue Data
Sauget Area I

Compounds	Shrimp BP Comp Concentration	ER Q
Herbicides, ug/kg		
2,4,5-T	10	U
2,4,5-TP (Silvex)	10	U
2,4-D	10	U
2,4-DB	10	U
Dalapon	2000	U
Dicamba	20	U
Dichloroprop	100	U
Dinoseb	100	U
MCPA[(4-chloro-2-methylphenoxy)-acetic a	2000	U
MCPP[2-(4-chloro-2-methylphenoxy)-propan	2000	U
Pentachlorophenol	1.8	J
Aluminum	28	
Antimony	0.16	J
Arsenic	2.0	U
Beryllium	1.0	U
Cadmium	0.50	U
Chromium	0.23	J
Copper	8.3	
Cyanide, Total	10	U
Lead	0.39	J
Mercury	0.095	U
Nickel	10	U
Selenium	0.50	U
Silver	0.090	J
Zinc	16	
% Lipid	0.03	
PCBs and Pesticides, ug/kg		
Decachlorobiphenyl	100	U
Dichlorobiphenyl	20	U
Heptachlorobiphenyl	60	U
Hexachlorobiphenyl	40	U
Monochlorobiphenyl	20	U
Nonachlorobiphenyl	100	U
Octachlorobiphenyl	60	U
Pentachlorobiphenyl	40	U
Tetrachlorobiphenyl	40	U
Trichlorobiphenyl	20	U
Total PCBs	40	U
4,4'-DDD	4.0	U
4,4'-DDE	4.0	U
4,4'-DDT	4.0	U
Total DDT	4	U
Aldrin	2.0	U
Alpha Chlordane	2.0	U
alpha-BHC	2.0	U
beta-BHC	2.0	U
delta-BHC	2.0	U
Dieldrin	4.0	U
Endosulfan I	2.0	U
Endosulfan II	4.0	U
Endosulfan sulfate	4.0	U
Endrin	4.0	U
Endrin aldehyde	4.0	U
Endrin ketone	4.0	U
Gamma Chlordane	2.0	U
gamma-BHC (Lindane)	2.0	U
Heptachlor	2.0	U
Heptachlor epoxide	2.0	U
Methoxychlor	20	U
Toxaphene	110	U
SVOCs, ug/kg		
1,2,4-Trichlorobenzene	340	U
1,2-Dichlorobenzene	340	U
1,3-Dichlorobenzene	340	U
1,4-Dichlorobenzene	340	U
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	340	U
2,4,5-Trichlorophenol	840	U
2,4,6-Trichlorophenol	340	U
2,4-Dichlorophenol	340	U
2,4-Dimethylphenol	340	U
2,4-Dinitrophenol	840	U
2,4-Dinitrotoluene	340	U
2,6-Dinitrotoluene	340	U
2-Chloronaphthalene	340	U
2-Chlorophenol	340	U
2-Methyl-4,6-dinitrophenol	840	U
2-Methylnaphthalene	340	U
2-Methylphenol (o-cresol)	340	U
2-Nitroaniline	840	U
2-Nitrophenol	340	U
3&4-Methylphenol (m&p-cresol)	340	U
3,3'-Dichlorobenzidine	340	U
3-Nitroaniline	840	U
4-Bromophenylphenyl ether	340	U

Borrow Pit Lake Shrimp Tissue Data
Sauget Area I

Compounds	Shrimp BP Comp Concentration	ER Q
4-Chloro-3-methylphenol	340	U
4-Chloroaniline	340	U
4-Chlorophenylphenyl ether	340	U
4-Nitroaniline	840	U
4-Nitrophenol	840	U
Acenaphthene	340	U
Acenaphthylene	340	U
Anthracene	340	U
Benzo(a)anthracene	340	U
Benzo(a)pyrene	340	U
Benzo(b)fluoranthene	340	U
Benzo(g,h,i)perylene	340	U
Benzo(k)fluoranthene	340	U
bis(2-Chloroethoxy)methane	340	U
bis(2-Chloroethyl)ether	340	U
bis(2-Ethylhexyl)phthalate	340	U
Butylbenzylphthalate	340	U
Carbazole	340	U
Chrysene	340	U
Di-n-butylphthalate	340	U
Di-n-octylphthalate	340	U
Dibenzo(a,h)anthracene	340	U
Dibenzofuran	340	U
Diethylphthalate	44	
Dimethylphthalate	340	U
Fluoranthene	340	U
Fluorene	340	U
Hexachlorobenzene	340	U
Hexachlorobutadiene	340	U
Hexachlorocyclopentadiene	340	U
Hexachloroethane	340	U
Indeno(1,2,3-cd)pyrene	340	U
Isophorone	340	U
n-Nitrosodi-n-propylamine	340	U
N-Nitrosodiphenylamine/Diphenylamine	340	U
Naphthalene	340	U
Nitrobenzene	340	U
Pentachlorophenol	840	U
Phenanthrene	340	U
Phenol	340	U
Pyrene	340	U
Total PAHs	340	U
Dioxins and Furans, ug/kg		
1,2,3,4,6,7,8,9-OCDD	0.0198	
1,2,3,4,6,7,8,9-OCDF	0.0043	
1,2,3,4,6,7,8-HpCDD	0.0031	
1,2,3,4,6,7,8-HpCDF	0.0015	
1,2,3,4,7,8,9-HpCDF	0.0004	U
1,2,3,4,7,8-HxCDD	0.0003	U
1,2,3,4,7,8-HxCDF	0.0002	U
1,2,3,6,7,8-HxCDD	0.0002	U
1,2,3,6,7,8-HxCDF	0.0002	U
1,2,3,7,8,9-HxCDD	0.0003	U
1,2,3,7,8,9-HxCDF	0.0002	U
1,2,3,7,8-PeCDD	0.0003	U
1,2,3,7,8-PeCDF	0.0002	U
2,3,4,6,7,8-HxCDF	0.0002	U
2,3,4,7,8-PeCDF	0.0002	U
2,3,7,8-TCDD	0.0002	U
2,3,7,8-TCDF	0.0018	
2,3,7,8-TCDF	0.0016	
Total HpCDD	0.0076	
Total HpCDF	0.0046	
Total HxCDD	0.005	
Total HxCDF	0.0028	
Total PeCDD	0.002	
Total PeCDF	0.0025	
Total TCDD	0.0002	U
Total TCDF	0.0049	

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.11

Summary Statistics for Reference Shrimp Data
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T (ug/kg)	2		0%			5.00
2,4,5-TP (Silvex)	2	1	50%	1.3	1.3	3.15
2,4-D	2		0%			5.00
2,4-DB	2		0%			5.00
Dalapon	2		0%			1000
Dicamba	2		0%			10
Dichloroprop	2		0%			50
Dinoseb	2		0%			50
MCPA[(4-chloro-2-methylphenoxy)-acetic a	2		0%			1000
MCPP[2-(4-chloro-2-methylphenoxy)-propan	2	1	50%	4400	4400	2700
Pentachlorophenol	2	2	100%	1.5	3.9	2.70
Metals, mg/kg						
Aluminum	2	2	100%	60	100	80
Antimony	2		0%			0.09
Arsenic	2	1	50%	1.2	1.2	1.10
Beryllium	2		0%			0.44
Cadmium	2		0%			0.22
Chromium	2	2	100%	0.26	0.28	0.27
Copper	2	2	100%	8.5	16	12
Cyanide, Total	2		0%			5.00
Lead	2	2	100%	0.38	0.61	0.50
Mercury	2		0%			0.04
Nickel	2		0%			4.35
Selenium	2	2	100%	0.47	0.61	0.54
Silver	2	2	100%	0.059	0.062	0.06
Zinc	2	2	100%	15	17	16
% Lipid	2	2	100%	0.27	0.38	0.33
PCBs and Pesticides, ug/kg						
Decachlorobiphenyl	2		0%			50
Dichlorobiphenyl	2		0%			10
Heptachlorobiphenyl	2		0%			30
Hexachlorobiphenyl	2		0%			20
Monochlorobiphenyl	2		0%			10
Nonachlorobiphenyl	2		0%			50
Octachlorobiphenyl	2		0%			30
Pentachlorobiphenyl	2	1	50%	22	22	21
Tetrachlorobiphenyl	2		0%			20
Trichlorobiphenyl	2		0%			10
4,4'-DDD (ug/kg)	2		0%			2.00
4,4'-DDE	2		0%			2.00
4,4'-DDT	2		0%			2.00
Aldrin	2		0%			1.00
Alpha Chlordane	2		0%			1.00
alpha-BHC	2		0%			1.00
beta-BHC	2		0%			1.00
delta-BHC	2		0%			1.00
Dieldrin	2		0%			2.00
Endosulfan I	2		0%			1.00
Endosulfan II	2		0%			2.00
Endosulfan sulfate	2		0%			2.00
Endrin	2		0%			2.00
Endrin aldehyde	2		0%			2.00
Endrin ketone	2		0%			2.00
Gamma Chlordane	2		0%			1.00
gamma-BHC (Lindane)	2		0%			1.00
Heptachlor	2		0%			1.00
Heptachlor epoxide	2		0%			1.00
Methoxychlor	2		0%			10
Toxaphene	2		0%			55
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	2		0%			170
1,2-Dichlorobenzene	2		0%			170
1,3-Dichlorobenzene	2		0%			170
1,4-Dichlorobenzene	2		0%			170
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	2		0%			170
2,4,5-Trichlorophenol	2		0%			420
2,4,6-Trichlorophenol	2		0%			170
2,4-Dichlorophenol	2		0%			170
2,4-Dimethylphenol	2		0%			170
2,4-Dinitrophenol	2		0%			420
2,4-Dinitrotoluene	2		0%			170
2,6-Dinitrotoluene	2		0%			170
2-Chloronaphthalene	2		0%			170
2-Chlorophenol	2		0%			170
2-Methyl-4,6-dinitrophenol	2		0%			420
2-Methylnaphthalene	2		0%			170
2-Methylphenol (o-cresol)	2		0%			170
2-Nitroaniline	2		0%			420
2-Nitrophenol	2		0%			170

Summary Statistics for Reference Shrimp Data
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
3&4-Methylphenol (m&p-cresol)	2		0%			170
3,3'-Dichlorobenzidine	2		0%			170
3-Nitroaniline	2		0%			420
4-Bromophenylphenyl ether	2		0%			170
4-Chloro-3-methylphenol	2		0%			170
4-Chloroaniline	2		0%			170
4-Chlorophenylphenyl ether	2		0%			170
4-Nitroaniline	2		0%			420
4-Nitrophenol	2		0%			420
Acenaphthene	2		0%			170
Acenaphthylene	2		0%			170
Anthracene	2		0%			170
Benzo(a)anthracene	2		0%			170
Benzo(a)pyrene	2		0%			170
Benzo(b)fluoranthene	2		0%			170
Benzo(g,h,i)perylene	2		0%			170
Benzo(k)fluoranthene	2		0%			170
bis(2-Chloroethoxy)methane	2		0%			170
bis(2-Chloroethyl)ether	2		0%			170
bis(2-Ethylhexyl)phthalate	2	2	100%	92	98	95
Butylbenzylphthalate	2		0%			170
Carbazole	2		0%			170
Chrysene	2		0%			170
Di-n-butylphthalate	2		0%			170
Di-n-octylphthalate	2		0%			170
Dibenzo(a,h)anthracene	2		0%			170
Dibenzofuran	2		0%			170
Diethylphthalate	2	2	100%	57	59	58
Dimethylphthalate	2		0%			170
Fluoranthene	2		0%			170
Fluorene	2		0%			170
Hexachlorobenzene	2		0%			170
Hexachlorobutadiene	2		0%			170
Hexachlorocyclopentadiene	2		0%			170
Hexachloroethane	2		0%			170
Indeno(1,2,3-cd)pyrene	2		0%			170
Isophorone	2		0%			170
n-Nitrosodi-n-propylamine	2		0%			170
N-Nitrosodiphenylamine/Diphenylamine	2		0%			170
Naphthalene	2		0%			170
Nitrobenzene	2		0%			170
Pentachlorophenol	2		0%			420
Phenanthrene	2		0%			170
Phenol	2		0%			170
Pyrene	2		0%			170
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	2	2	100%	1.66E-02	2.99E-02	2.33E-02
1,2,3,4,6,7,8,9-OCDF	2	1	50%	1.10E-03	1.10E-03	6.75E-04
1,2,3,4,6,7,8-HpCDD	2	2	100%	1.10E-03	2.40E-03	1.75E-03
1,2,3,4,6,7,8-HpCDF	2		0%			1.25E-04
1,2,3,4,7,8,9-HpCDF	2		0%			2.00E-04
1,2,3,4,7,8-HxCDD	2		0%			1.75E-04
1,2,3,4,7,8-HxCDF	2		0%			1.00E-04
1,2,3,6,7,8-HxCDD	2		0%			1.50E-04
1,2,3,6,7,8-HxCDF	2		0%			1.00E-04
1,2,3,7,8,9-HxCDD	2	1	50%	6.90E-04	6.90E-04	4.45E-04
1,2,3,7,8,9-HxCDF	2		0%			1.25E-04
1,2,3,7,8-PeCDD	2		0%			1.75E-04
1,2,3,7,8-PeCDF	2		0%			1.25E-04
2,3,4,6,7,8-HxCDF	2		0%			1.00E-04
2,3,4,7,8-PeCDF	2		0%			1.25E-04
2,3,7,8-TCDD	2		0%			1.50E-04
2,3,7,8-TCDF	2		0%			1.00E-04
2,3,7,8-TCDF						
Total HpCDD	2	2	100%	3.50E-03	9.80E-03	6.65E-03
Total HpCDF	2	2	100%	3.70E-04	1.00E-03	6.85E-04
Total HxCDD	2	2	100%	2.30E-03	7.10E-03	4.70E-03
Total HxCDF	2	2	100%	6.20E-04	1.10E-03	8.60E-04
Total PeCDD	2	2	100%	2.00E-03	4.20E-03	3.10E-03
Total PeCDF	2	1	50%	5.40E-04	5.40E-04	3.45E-04
Total TCDD	2	1	50%	5.30E-04	5.30E-04	3.40E-04
Total TCDF	2		0%			1.00E-04

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.12

Borrow Pit Lake Clam Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			22
2,4,5-TP (Silvex)	3		0%			22
2,4-D	3		0%			22
2,4-DB	3		0%			22
Dalapon	3		0%			4333
Dicamba	3		0%			42
Dichloroprop	3	3	100%	3.2	32	18
Dinoseb	3		0%			217
MCPA[(4-chloro-2-methylphenoxy)-acetic a	3		0%			4333
MCPP[2-(4-chloro-2-methylphenoxy)-propan	3	1	33%	4000	4000	5000
Pentachlorophenol	3		0%			43
Metals, mg/kg						
Aluminum	3	3	100%	7.5	13	10.5
Antimony	3		0%			0.09
Arsenic	3	1	33%	0.96	0.96	1.82
Beryllium	3		0%			0.455
Cadmium	3	2	67%	0.074	0.12	0.14
Chromium	3	3	100%	0.22	1.1	0.68
Copper	3	3	100%	0.6	0.99	0.86
Cyanide, Total	3		0%			5
Lead	3	1	33%	0.25	0.25	0.23
Mercury	3		0%			0.04
Nickel	3		0%			4.55
Selenium	3		0%			0.225
Silver	3	1	33%	0.015	0.015	0.04
Zinc	3	3	100%	8.9	22	14.97
% Lipid	3	3	100%	0.05	0.23	0.12
PCB, ug/kg						
Decachlorobiphenyl	3		0%			33.33
Dichlorobiphenyl	3		0%			6.67
Heptachlorobiphenyl	3		0%			20.00
Hexachlorobiphenyl	3		0%			13.33
Monochlorobiphenyl	3		0%			7
Nonachlorobiphenyl	3		0%			33.33
Octachlorobiphenyl	3		0%			20.00
Pentachlorobiphenyl	3		0%			13.33
Tetrachlorobiphenyl	3		0%			13.33
Trichlorobiphenyl	3		0%			7
Total PCBs	3		0%			13.00
Pesticides, ug/kg						
4,4'-DDD	3		0%			12
4,4'-DDE	3		0%			12
4,4'-DDT	3		0%			12
Total DDT	3		0%			12
Aldrin	3		0%			6.12
Alpha Chlordane	3		0%			6.12
alpha-BHC	3		0%			6.12
beta-BHC	3		0%			6.12
delta-BHC	3		0%			6.12
Dieldrin	3		0%			12
Endosulfan I	3		0%			6.12
Endosulfan II	3		0%			12
Endosulfan sulfate	3		0%			12
Endrin	3		0%			12
Endrin aldehyde	3		0%			12
Endrin ketone	3		0%			12
Gamma Chlordane	3		0%			6.12
gamma-BHC (Lindane)	3		0%			6.12
Heptachlor	3	1	33%	2.3	2.3	3.55
Heptachlor epoxide	3		0%			6.12
Methoxychlor	3	1	33%	5.4	5.4	30
Toxaphene	3		0%			327
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			113
1,2-Dichlorobenzene	3		0%			113
1,3-Dichlorobenzene	3		0%			113
1,4-Dichlorobenzene	3		0%			113
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	3		0%			113
2,4,5-Trichlorophenol	3		0%			280
2,4,6-Trichlorophenol	3		0%			113
2,4-Dichlorophenol	3		0%			113
2,4-Dimethylphenol	3		0%			113
2,4-Dinitrophenol	3		0%			280
2,4-Dinitrotoluene	3		0%			113
2,6-Dinitrotoluene	3		0%			113
2-Chloronaphthalene	3		0%			113
2-Chlorophenol	3		0%			113
2-Methyl-4,6-dinitrophenol	3		0%			280
2-Methylnaphthalene	3		0%			113

Borrow Pit Lake Clam Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
2-Methylphenol (o-cresol)	3		0%			113
2-Nitroaniline	3		0%			280
2-Nitrophenol	3		0%			113
3&4-Methylphenol (m&p-cresol)	3		0%			113
3,3'-Dichlorobenzidine	3		0%			113
3-Nitroaniline	3		0%			280
4-Bromophenylphenyl ether	3		0%			113
4-Chloro-3-methylphenol	3		0%			113
4-Chloroaniline	3		0%			113
4-Chlorophenylphenyl ether	3		0%			113
4-Nitroaniline	3		0%			280
4-Nitrophenol	3		0%			280
Acenaphthene	3		0%			113
Acenaphthylene	3		0%			113
Anthracene	3		0%			113
Benzo(a)anthracene	3		0%			113
Benzo(a)pyrene	3		0%			113
Benzo(b)fluoranthene	3		0%			113
Benzo(g,h,i)perylene	3		0%			113
Benzo(k)fluoranthene	3		0%			113
bis(2-Chloroethoxy)methane	3		0%			113
bis(2-Chloroethyl)ether	3		0%			113
bis(2-Ethylhexyl)phthalate	3	3	100%	55	170	99
Butylbenzylphthalate	3		0%			113
Carbazole	3		0%			113
Chrysene	3		0%			113
Di-n-butylphthalate	3		0%			113
Di-n-octylphthalate	3		0%			113
Dibenzo(a,h)anthracene	3		0%			113
Dibenzofuran	3		0%			113
Diethylphthalate	3	3	100%	53	120	75
Dimethylphthalate	3		0%			113
Fluoranthene	3		0%			113
Fluorene	3		0%			113
Hexachlorobenzene	3		0%			113
Hexachlorobutadiene	3		0%			113
Hexachlorocyclopentadiene	3		0%			113
Hexachloroethane	3		0%			113
Indeno(1,2,3-cd)pyrene	3		0%			113
Isophorone	3		0%			113
n-Nitrosodi-n-propylamine	3		0%			113
N-Nitrosodiphenylamine/Diphenylamine	3		0%			113
Naphthalene	3		0%			113
Nitrobenzene	3		0%			113
Pentachlorophenol	3		0%			280
Phenanthrene	3		0%			113
Phenol	3		0%			113
Pyrene	3		0%			113
Total PAHs	3		0%			113
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	3.40E-03	1.51E-02	8.07E-03
1,2,3,4,6,7,8,9-OCDF	3		0%			3.67E-04
1,2,3,4,6,7,8-HpCDD	3	1	33%	1.40E-03	1.40E-03	6.17E-04
1,2,3,4,6,7,8-HpCDF	3		0%			1.67E-04
1,2,3,4,7,8,9-HpCDF	3		0%			2.50E-04
1,2,3,4,7,8-HxCDD	3		0%			2.00E-04
1,2,3,4,7,8-HxCDF	3		0%			1.17E-04
1,2,3,6,7,8-HxCDD	3		0%			1.67E-04
1,2,3,6,7,8-HxCDF	3		0%			1.00E-04
1,2,3,7,8,9-HxCDD	3		0%			2.00E-04
1,2,3,7,8,9-HxCDF	3		0%			1.33E-04
1,2,3,7,8-PeCDD	3		0%			1.33E-04
1,2,3,7,8-PeCDF	3		0%			1.00E-04
2,3,4,6,7,8-HxCDF	3		0%			1.00E-04
2,3,4,7,8-PeCDF	3		0%			1.00E-04
2,3,7,8-TCDD	3		0%			1.00E-04
2,3,7,8-TCDF	1	1	100%	1.00E-03	1.00E-03	1.00E-03
2,3,7,8-TCDF	3	3	100%	3.10E-04	1.50E-03	8.23E-04
Total HpCDD	3	1	33%	3.40E-03	3.40E-03	1.28E-03
Total HpCDF	3		0%			2.00E-04
Total HxCDD	3	1	33%	5.50E-04	5.50E-04	2.83E-04
Total HxCDF	3		0%			1.17E-04
Total PeCDD	3		0%			1.33E-04
Total PeCDF	3	2	67%	1.30E-03	1.40E-03	9.17E-04
Total TCDD	3	3	100%	1.70E-04	1.40E-03	8.90E-04
Total TCDF	3	3	100%	9.30E-04	8.00E-03	4.51E-03

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Appendix C-3.13

Reference Area Clam Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
Herbicides, ug/kg						
2,4,5-T	3		0%			20
2,4,5-TP (Silvex)	3		0%			20
2,4-D	3		0%			20
2,4-DB	3		0%			20
Dalapon	3		0%			4000
Dicamba	3		0%			40
Dichloroprop	3	3	100%	6.5	87	35
Dinoseb	3		0%			200
MCPA[(4-chloro-2-methylphenoxy)-acetic a	3	1	33%	1400	1400	7467
MCPP[2-(4-chloro-2-methylphenoxy)-propan	3		0%			7333
Pentachlorophenol	3		0%			40
Metals, mg/kg						
Aluminum	3	3	100%	14	26	18
Antimony	3		0%			0.093
Arsenic	3	1	33%	0.65	0.65	1.8
Beryllium	*3*		*0%*			*0.47*
Cadmium	3	3	100%	0.16	0.61	0.43
Chromium	3	3	100%	0.79	2.2	1.5
Copper	3	3	100%	1.6	2.4	2.1
Cyanide, Total	3		0%			5.0
Lead	3	2	67%	0.44	0.59	0.42
Mercury	3		0%			0.041
Nickel	3		0%			4.7
Selenium	3	1	33%	0.48	0.48	0.31
Silver	3		0%			0.047
Zinc	3	3	100%	21	52	36
% Lipid	3	3	100%	0.090	0.12	0.11
PCB, ug/kg						
Decachlorobiphenyl	3		0%			25
Dichlorobiphenyl	3		0%			5
Heptachlorobiphenyl	3		0%			15
Hexachlorobiphenyl	3		0%			10
Monochlorobiphenyl	3		0%			5
Nonachlorobiphenyl	3		0%			25
Octachlorobiphenyl	3		0%			15
Pentachlorobiphenyl	3		0%			10
Tetrachlorobiphenyl	3		0%			10
Trichlorobiphenyl	3		0%			5
Total PCBs						
Pesticides, ug/kg	3		0%			9.6
4,4'-DDD	3		0%			9.6
4,4'-DDE	3		0%			9.6
4,4'-DDT	3		0%			5.1
Aldrin	3		0%			5.1
Alpha Chlordane	3		0%			5.1
alpha-BHC	3		0%			5.1
beta-BHC	3		0%			5.1
delta-BHC	3		0%			9.6
Dieldrin	3		0%			5.1
Endosulfan I	3		0%			9.6
Endosulfan II	3		0%			9.6
Endosulfan sulfate	3		0%			9.6
Endrin	3		0%			9.6
Endrin aldehyde	3		0%			9.6
Endrin ketone	3		0%			5.1
Gamma Chlordane	3		0%			5.1
gamma-BHC (Lindane)	3		0%			5.1
Heptachlor	3		0%			5.1
Heptachlor epoxide	3		0%			51
Methoxychlor	3		0%			263
Toxaphene	3		0%			85
SVOCs, ug/kg						
1,2,4-Trichlorobenzene	3		0%			85
1,2-Dichlorobenzene	3		0%			85
1,3-Dichlorobenzene	3		0%			85
1,4-Dichlorobenzene	3		0%			85
2,2'-Oxybis(1-chloropropane)[bis(2-Chlor	3		0%			210
2,4,5-Trichlorophenol	3		0%			85
2,4,6-Trichlorophenol	3		0%			85
2,4-Dichlorophenol	3		0%			85
2,4-Dimethylphenol	3		0%			210
2,4-Dinitrophenol	3		0%			85
2,4-Dinitrotoluene	3		0%			85
2,6-Dinitrotoluene	3		0%			85
2-Chloronaphthalene	3		0%			85
2-Chlorophenol	3		0%			210
2-Methyl-4,6-dinitrophenol	3		0%			85
2-Methylnaphthalene	3		0%			85
2-Methylphenol (o-cresol)	3		0%			210

Reference Area Clam Summary Statistics
Sauget Area I

Compounds	Number Analyzed	Number Detected	Frequency of Detection	Minimum Detected	Maximum Detected	Average Concentration
2-Nitroaniline	3		0%			85
2-Nitrophenol	3		0%			85
3&4-Methylphenol (m&p-cresol)	3		0%			85
3,3'-Dichlorobenzidine	3		0%			210
3-Nitroaniline	3		0%			85
4-Bromophenylphenyl ether	3		0%			85
4-Chloro-3-methylphenol	3		0%			85
4-Chloroaniline	3		0%			85
4-Chlorophenylphenyl ether	3		0%			210
4-Nitroaniline	3		0%			210
4-Nitrophenol	3		0%			85
Acenaphthene	3		0%			85
Acenaphthylene	3		0%			85
Anthracene	3		0%			85
Benzo(a)anthracene	3		0%			85
Benzo(a)pyrene	3		0%			85
Benzo(b)fluoranthene	3		0%			85
Benzo(g,h,i)perylene	3		0%			85
Benzo(k)fluoranthene	3		0%			85
bis(2-Chloroethoxy)methane	3		0%			85
bis(2-Chloroethyl)ether	3	3	100%	47	73	62
bis(2-Ethylhexyl)phthalate	3		0%			85
Butylbenzylphthalate	3		0%			85
Carbazole	3		0%			85
Chrysene	3		0%			85
Di-n-butylphthalate	3		0%			85
Di-n-octylphthalate	3		0%			85
Dibenzo(a,h)anthracene	3		0%			85
Dibenzofuran	3	3	100%	49	59	53
Diethylphthalate	3		0%			85
Dimethylphthalate	3		0%			85
Fluoranthene	3		0%			85
Fluorene	3		0%			85
Hexachlorobenzene	3		0%			85
Hexachlorobutadiene	3		0%			85
Hexachlorocyclopentadiene	3		0%			85
Hexachloroethane	3		0%			85
Indeno(1,2,3-cd)pyrene	3		0%			85
Isophorone	3		0%			85
n-Nitrosodi-n-propylamine	3		0%			85
N-Nitrosodiphenylamine/Diphenylamine	3		0%			85
Naphthalene	3		0%			85
Nitrobenzene	3		0%			210
Pentachlorophenol	3		0%			85
Phenanthrene	3		0%			85
Phenol	3		0%			85
Pyrene	3	3	100%	0.0068	0.012	0.0098
Total PAHs						
Dioxins and Furans, ug/kg						
1,2,3,4,6,7,8,9-OCDD	3	3	100%	6.80E-03	1.24E-02	9.80E-03
1,2,3,4,6,7,8,9-OCDF	3	1	33%	1.80E-03	1.80E-03	8.50E-04
1,2,3,4,6,7,8-HpCDD	3	2	67%	5.90E-04	1.00E-03	6.63E-04
1,2,3,4,6,7,8-HpCDF	3		0%			1.67E-04
1,2,3,4,7,8,9-HpCDF	3		0%			2.50E-04
1,2,3,4,7,8-HxCDD	3		0%			1.67E-04
1,2,3,4,7,8-HxCDF	3		0%			1.00E-04
1,2,3,6,7,8-HxCDD	3		0%			1.67E-04
1,2,3,6,7,8-HxCDF	3		0%			1.00E-04
1,2,3,7,8,9-HxCDD	3		0%			2.00E-04
1,2,3,7,8,9-HxCDF	3		0%			1.50E-04
1,2,3,7,8-PeCDD	3		0%			1.50E-04
1,2,3,7,8-PeCDF	3		0%			1.00E-04
2,3,4,6,7,8-HxCDF	3		0%			1.00E-04
2,3,4,7,8-PeCDF	3		0%			1.00E-04
2,3,7,8-TCDD	3		0%			1.00E-04
2,3,7,8-TCDF						
2,3,7,8-TCDF	3	1	33%	2.50E-04	2.50E-04	1.67E-04
Total HpCDD	3	2	67%	1.10E-03	2.40E-03	1.30E-03
Total HpCDF	3		0%			2.00E-04
Total HxCDD	3	1	33%	2.60E-04	2.60E-04	2.20E-04
Total HxCDF	3		0%			1.00E-04
Total PeCDD	3		0%			1.50E-04
Total PeCDF	3	2	67%	2.50E-04	2.10E-03	8.17E-04
Total TCDD	3	3	100%	7.00E-05	3.70E-03	2.02E-03
Total TCDF	3	2	67%	1.40E-03	1.70E-03	1.07E-03

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

Table C-3.14
Snail Summary Statistics From Dead Creek Sections B, C, D and Reference Areas
Sauget Area I

	Number Analyzed	Number Detected	Detection Frequency (%)	Minimum Detected	Maximum Detected	Average
Herbicides (ug/kg)						
2,4-D	5					5.0
2,4-DB	5					5.0
Dicamba	5	1	20	8.4	8.4	9.7
Dichloroprop	5					50
MCPA	5	1	20	6400	6400	2080
MCPP	5	2	40	2600	3300	1780
Pentachlorophenol	5	3	60	1.1	15	8.4
Metals (mg/kg)						
Aluminum	5	5	100	320	710	504
Antimony	5	1	20	0.12	0.12	0.10
Arsenic	5	5	100	1.5	2.0	1.7
Beryllium	5					0.46
Cadmium	5	4	80	0.07	0.67	0.34
Chromium	5	5	100	0.89	3.1	1.9
Copper	5	5	100	10	120	49
Lead	5	5	100	2.3	11	5.2
Mercury	5					0.04
Nickel	5	5	100	1.7	21	7.5
Selenium	5	1	20	0.49	0.49	0.28
Silver	5	5	100	0.018	0.068	0.047
Zinc	5	5	100	12	110	48
% Lipids	5	5	100	0.090	0.26	0.16
PCBs (ug/kg)						
Monochlorobiphenyl	5					6.0
Dichlorobiphenyl	5					6.0
Trichlorobiphenyl	5	1	20	22	22	9.4
Tetrachlorobiphenyl	5	2	40	76	200	63
Pentachlorobiphenyl	5	3	60	51	250	100
Hexachlorobiphenyl	5	3	60	26	110	49
Heptachlorobiphenyl	5					18
Octachlorobiphenyl	5					18
Nonachlorobiphenyl	5					30
Decachlorobiphenyl	5					30
Pesticides (ug/kg)						
4,4'-DDD	5					9.1
4,4'-DDE	5	2	40	29	30	16
4,4'-DDT	5					9.1
Aldrin	5					4.9
Alpha Chlordane	5					4.9
delta-BHC	5					4.9
Dieldrin	5					9.1
Endosulfan I	5					4.9
Endosulfan II	5					9.1
Endosulfan sulfate	5	1	20	3.7	3.7	9.1
Endrin aldehyde	5					9.1
Endrin ketone	5	1	20	7.1	7.1	7.9
Gamma Chlordane	5	3	60	9.5	41	15
gamma-BHC (Lindane)	5					4.9
Heptachlor	5					4.9
Heptachlor epoxide	5	2	40	24	66	20
Methoxychlor	5					49

Table C-3.14
Snail Summary Statistics From Dead Creek Sections B, C, D and Reference Areas
Sauget Area I

	Number Analyzed	Number Detected	Detection Frequency (%)	Minimum Detected	Maximum Detected	Average
SVOCs (ug/kg)						
Acenaphthylene	5					102
Benzo(a)pyrene	5	1	20	31	31	91
Benzo(b)fluoranthene	5	1	20	79	79	101
Benzo(g,h,i)perylene	5					102
Benzo(k)fluoranthene	5					102
bis(2-Ethylhexyl)phthalate	5	5	100	78	230	133
Di-n-butylphthalate	5					102
Dibenzo(a,h)anthracene	5					102
Diethylphthalate	5	5	100	54	63	59
Fluoranthene	5					102
Indeno(1,2,3-cd)pyrene	5					102
Dioxins/Furans (ug/kg)						
1,2,3,4,6,7,8,9-OCDD	5	5	100	0.29	13	3.7
1,2,3,4,6,7,8,9-OCDF	5	5	100	0.0014	6.0	1.5
1,2,3,4,6,7,8-HpCDD	5	5	100	0.0077	1.6	0.44
1,2,3,4,6,7,8-HpCDF	5	3	60	0.084	1.1	0.28
1,2,3,4,7,8,9-HpCDF	5	3	60	0.0054	0.073	0.018
1,2,3,4,7,8-HxCDD	5	3	60	0.0022	0.0071	0.0028
1,2,3,4,7,8-HxCDF	5	3	60	0.0043	0.029	0.00824
1,2,3,6,7,8-HxCDD	5	3	60	0.0085	0.0599	0.01718
1,2,3,6,7,8-HxCDF	5	3	60	0.0015	0.0121	0.00362
1,2,3,7,8,9-HxCDD	5	3	60	0.0066	0.0239	0.0085
1,2,3,7,8,9-HxCDF	5	1	20	0.0012	0.0012	0.00032
1,2,3,7,8-PeCDD	5	3	60	0.0026	0.006	0.00236
1,2,3,7,8-PeCDF	5	3	60	0.0006	0.0023	0.00082
2,3,4,6,7,8-HxCDF	5	3	60	0.0028	0.0207	0.00646
2,3,4,7,8-PeCDF	5	3	60	0.0021	0.0109	0.00353
2,3,7,8-TCDD	5	3	60	0.00061	0.0014	0.000672
2,3,7,8-TCDF (avg)	5	3	60	0.00385	0.01695	0.00562
Total HpCDD	5	5	100	0.0204	2.84	0.8091
Total HpCDF	5	5	100	0.00097	4.16	1.057034
Total HxCDD	5	5	100	0.0021	0.368	0.11636
Total HxCDF	5	4	80	0.00039	0.635	0.179188
Total PeCDD	5	3	60	0.0353	0.138	0.04508
Total PeCDF	5	3	60	0.0351	0.192	0.06381
Total TCDD	5	4	80	0.00035	0.526	0.13329
Total TCDF	5	3	60	0.0533	0.231	0.08108

Note:
One-half the detection limit is used to represent non-detects in the calculation of average concentrations.

SOIL SUMMARY STATISTICS

Appendix C-4.1
Summary Statistics for Background Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilke's Test for Normality(a): Dataset Distribution	Summary Statistics: Minimum	Summary Statistics: Mean	Summary Statistics: Maximum	95% Upper Confidence Limit: UCL (b)	Site Concentration (c)
8280A	1998 Total TEQ w/ EMPC as ND	ppb	3	3	100%	3	Lognormal	4.72E-03	6.19E-02	1.72E-01	9.55E+13	1.72E-01
HERB	MCPP[2-(4-chloro-2-methylphenoxy)-propan	ug/kg dw	3	3	100%	3	Normal	2.50E+03	4.98E+03	6.55E+03	8.65E+03	6.55E+03
HERB	2,4,5-TP (Silvex)	ug/kg dw	3	3	100%	3	Normal	5.60E+00	8.68E+00	1.10E+01	1.31E+01	1.10E+01
HERB	MCPA[(4-chloro-2-methylphenoxy)-acetic a	ug/kg dw	3	3	100%	3	Lognormal	4.30E+03	7.25E+03	1.30E+04	2.93E+05	1.30E+04
METALS	Aluminum	mg/kg dw	3	3	100%	3	Lognormal	6.10E+03	1.27E+04	1.90E+04	7.29E+04	1.90E+04
METALS	Iron	mg/kg dw	3	3	100%	3	Lognormal	1.50E+04	1.90E+04	2.50E+04	3.95E+04	2.50E+04
METALS	Lead	mg/kg dw	3	3	100%	3	Lognormal	2.40E+01	9.25E+01	1.80E+02	1.38E+06	1.80E+02
METALS	Magnesium	mg/kg dw	3	3	100%	3	Lognormal	3.20E+03	8.62E+03	1.70E+04	7.47E+06	1.70E+04
METALS	Manganese	mg/kg dw	3	3	100%	3	Lognormal	3.90E+02	4.42E+02	5.35E+02	6.57E+02	5.35E+02
METALS	Mercury	mg/kg dw	3	3	100%	3	Lognormal	4.40E-02	8.87E-02	1.40E-01	2.06E+00	1.40E-01
METALS	Molybdenum	mg/kg dw	3	3	100%	3	Lognormal	7.20E-01	1.01E+00	1.40E+00	3.02E+00	1.40E+00
METALS	Nickel	mg/kg dw	3	3	100%	3	Normal	1.50E+01	2.13E+01	2.80E+01	3.23E+01	2.80E+01
METALS	Potassium	mg/kg dw	3	3	100%	3	Normal	1.30E+03	2.37E+03	3.50E+03	4.22E+03	3.50E+03
METALS	Silver	mg/kg dw	3	2	67%	3	Lognormal	3.25E-01	6.75E-01	1.10E+00	2.20E+01	1.10E+00
METALS	Sodium	mg/kg dw	3	1	33%	3	Lognormal	5.00E+01	2.88E+02	7.50E+02	3.67E+11	7.50E+02
METALS	Antimony	mg/kg dw	1	1	100%	1	NC	1.90E+00	1.90E+00	1.90E+00	NC	1.90E+00
METALS	Arsenic	mg/kg dw	3	3	100%	3	Lognormal	6.60E+00	9.57E+00	1.30E+01	2.90E+01	1.30E+01
METALS	Barium	mg/kg dw	3	3	100%	3	Normal	1.10E+02	1.82E+02	2.35E+02	2.90E+02	2.35E+02
METALS	Beryllium	mg/kg dw	3	3	100%	3	Lognormal	4.50E-01	7.53E-01	1.10E+00	4.90E+00	1.10E+00
METALS	Cadmium	mg/kg dw	3	3	100%	3	Lognormal	5.20E-01	4.32E+00	9.40E+00	2.50E+09	9.40E+00
METALS	Chromium	mg/kg dw	3	3	100%	3	Lognormal	1.70E+01	1.97E+01	2.50E+01	3.43E+01	2.50E+01
METALS	Cobalt	mg/kg dw	3	3	100%	3	Lognormal	5.50E+00	7.77E+00	1.04E+01	2.09E+01	1.04E+01
METALS	Copper	mg/kg dw	3	3	100%	3	Lognormal	3.50E+01	1.05E+02	1.90E+02	8.98E+04	1.90E+02
METALS	Vanadium	mg/kg dw	3	3	100%	3	Lognormal	2.80E+01	3.45E+01	4.45E+01	6.53E+01	4.45E+01
METALS	Zinc	mg/kg dw	3	3	100%	3	Lognormal	8.20E+01	4.04E+02	8.20E+02	1.23E+08	8.20E+02
METALS	Calcium	mg/kg dw	3	3	100%	3	Lognormal	4.00E+03	1.68E+04	4.00E+04	1.95E+10	4.00E+04
PCB	Total PCBs	ug/kg dw	3	2	67%	3	Lognormal	1.00E+01	6.00E+02	1.71E+03	1.91E+30	1.71E+03
PEST	4,4'-DDT	ug/kg dw	3	1	33%	3	Lognormal	2.00E+00	7.06E+00	1.70E+01	6.84E+06	1.70E+01
PEST	4,4'-DDE	ug/kg dw	3	1	33%	3	Lognormal	2.00E+00	8.06E+00	2.00E+01	7.22E+07	2.00E+01
SVOA	bis(2-Ethylhexyl)phthalate	ug/kg dw	3	2	67%	3	Lognormal	1.05E+02	1.61E+02	2.68E+02	2.15E+03	2.68E+02
SVOA	Anthracene	ug/kg dw	3	1	33%	1	NC	8.00E+01	8.00E+01	8.00E+01	NC	8.00E+01
SVOA	Pyrene	ug/kg dw	3	2	67%	3	Lognormal	1.13E+02	2.18E+02	3.60E+02	5.37E+03	3.60E+02
SVOA	Benzo(g,h,i)perylene	ug/kg dw	3	2	67%	2	Lognormal	4.50E+01	6.35E+01	8.20E+01	NC	8.20E+01
SVOA	Benzo(b)fluoranthene	ug/kg dw	3	2	67%	2	Lognormal	6.90E+01	8.95E+01	1.10E+02	NC	1.10E+02
SVOA	Fluoranthene	ug/kg dw	3	2	67%	3	Lognormal	1.13E+02	2.51E+02	4.40E+02	2.04E+04	4.40E+02
SVOA	Benzo(k)fluoranthene	ug/kg dw	3	2	67%	3	Normal	6.00E+01	1.04E+02	1.40E+02	1.73E+02	1.40E+02
SVOA	Chrysene	ug/kg dw	3	2	67%	3	Lognormal	9.70E+01	1.37E+02	2.00E+02	5.42E+02	2.00E+02
SVOA	Benzo(a)pyrene	ug/kg dw	3	2	67%	3	Lognormal	6.00E+01	9.33E+01	1.50E+02	8.83E+02	1.50E+02
SVOA	Benzo(a)anthracene	ug/kg dw	3	2	67%	3	Lognormal	7.70E+01	1.20E+02	1.70E+02	5.25E+02	1.70E+02
SVOA	Diethylphthalate	ug/kg dw	3	3	100%	3	Normal	6.00E+01	9.33E+01	1.10E+02	1.42E+02	1.10E+02
SVOA	Di-n-butylphthalate	ug/kg dw	3	2	67%	3	Lognormal	1.05E+02	1.58E+02	2.40E+02	9.51E+02	2.40E+02
SVOA	Phenanthrene	ug/kg dw	3	2	67%	3	Lognormal	1.00E+02	1.68E+02	2.90E+02	4.04E+03	2.90E+02
SVOA	Carbazole	ug/kg dw	3	1	33%	1	NC	3.20E+01	3.20E+01	3.20E+01	NC	3.20E+01
SVOA	Pentachlorophenol	ug/kg dw	3	2	67%	3	Lognormal	2.55E+02	3.71E+02	5.61E+02	1.90E+03	5.61E+02
VOA	2-Hexanone	ug/kg dw	3	1	33%	3	Normal	1.45E+01	1.65E+01	1.80E+01	1.95E+01	1.80E+01
VOA	Methylene chloride (Dichloromethane)	ug/kg dw	3	2	67%	3	Lognormal	1.70E+00	5.69E+00	1.20E+01	5.83E+04	1.20E+01

Appendix C-4.2
Summary Statistics for Floodplain Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilks's Test for Normality(a) Dataset Distribution	Summary Statistics Minimum	Summary Statistics Mean	Summary Statistics Maximum	95% Upper Confidence Limit UCL (b)	Site Concentration (c)
8280A	1998 Total TEQ w/ EMPC as ND	ug/kg dw	29	29	100%	29	Lognormal	1.43E-03	8.32E-03	5.24E-02	1.07E-02	1.07E-02
HERB	Dicamba	ug/kg dw	66	16	23%	16	Lognormal	1.30E+00	3.62E+00	2.30E+01	4.90E+00	4.90E+00
HERB	MCPP	ug/kg dw	66	10	15%	66	Lognormal	1.00E+03	1.74E+03	7.70E+03	1.86E+03	1.86E+03
HERB	MCPA	ug/kg dw	66	13	20%	66	Lognormal	1.00E+03	1.66E+03	7.40E+03	1.78E+03	1.78E+03
HERB	2,4-D	ug/kg dw	66	1	2%	2	Lognormal	5.00E+00	6.00E+00	6.60E+00	NC	6.60E+00
HERB	2,4-DB	ug/kg dw	66	4	6%	66	Lognormal	4.20E+00	6.40E+00	4.10E+01	6.62E+00	6.62E+00
METALS	Aluminum	mg/kg dw	66	66	100%	66	Lognormal	1.30E+03	9.30E+03	1.80E+04	1.01E+04	1.01E+04
METALS	Iron	mg/kg dw	66	66	100%	66	Lognormal	4.10E+03	1.51E+04	2.50E+04	1.63E+04	1.63E+04
METALS	Lead	mg/kg dw	66	66	100%	66	Lognormal	2.40E+01	7.00E+01	2.60E+02	7.80E+01	7.80E+01
METALS	Magnesium	mg/kg dw	66	66	100%	66	Lognormal	2.80E+03	6.00E+03	2.10E+04	6.46E+03	6.46E+03
METALS	Manganese	mg/kg dw	66	66	100%	66	Lognormal	1.20E+02	3.96E+02	1.20E+03	4.20E+02	4.20E+02
METALS	Mercury	mg/kg dw	66	66	100%	66	Lognormal	2.70E-02	7.80E-02	6.70E-01	8.00E-02	8.00E-02
METALS	Molybdenum	mg/kg dw	66	64	98%	66	Lognormal	2.20E-01	7.32E-01	3.20E+00	8.14E-01	8.14E-01
METALS	Nickel	mg/kg dw	66	66	100%	66	Lognormal	1.20E+01	1.91E+01	6.60E+01	2.00E+01	2.00E+01
METALS	Potassium	mg/kg dw	66	66	100%	66	Lognormal	1.20E+03	2.07E+03	3.80E+03	2.14E+03	2.14E+03
METALS	Silver	mg/kg dw	66	32	49%	66	Lognormal	2.00E-01	4.50E-01	6.00E-01	4.86E-01	4.86E-01
METALS	Thallium	mg/kg dw	66	17	26%	65	Lognormal	4.85E-01	6.44E-01	1.40E+00	6.77E-01	6.77E-01
METALS	Antimony	mg/kg dw	66	27	42%	65	Lognormal	3.15E-01	1.15E+00	2.60E+00	1.24E+00	1.24E+00
METALS	Arsenic	mg/kg dw	66	66	100%	66	Lognormal	2.00E+00	7.41E+00	3.40E+01	7.88E+00	7.88E+00
METALS	Barium	mg/kg dw	66	66	100%	65	Lognormal	4.00E+01	1.80E+02	1.20E+03	1.98E+02	1.98E+02
METALS	Beryllium	mg/kg dw	66	56	85%	65	Lognormal	1.70E-01	5.03E-01	1.10E+00	5.19E-01	5.19E-01
METALS	Cadmium	mg/kg dw	66	66	100%	65	Lognormal	4.00E-01	2.44E+00	8.40E+00	2.77E+00	2.77E+00
METALS	Chromium	mg/kg dw	66	66	100%	65	Lognormal	1.10E+01	1.69E+01	4.90E+01	1.79E+01	1.79E+01
METALS	Cobalt	mg/kg dw	66	66	100%	66	Lognormal	2.30E+00	6.62E+00	1.10E+01	7.01E+00	7.01E+00
METALS	Copper	mg/kg dw	65	65	100%	65	Lognormal	1.80E+01	6.99E+01	2.30E+02	8.09E+01	8.09E+01
METALS	Vanadium	mg/kg dw	66	66	100%	66	Lognormal	1.30E+01	2.82E+01	1.20E+02	2.99E+01	2.99E+01
METALS	Zinc	mg/kg dw	66	66	100%	66	Lognormal	7.90E+01	2.94E+02	1.40E+03	3.32E+02	3.32E+02
METALS	Calcium	mg/kg dw	66	66	100%	66	Lognormal	3.50E+03	2.61E+04	2.60E+05	3.04E+04	3.04E+04
METALS	Selenium	mg/kg dw	66	18	28%	66	Lognormal	4.80E-01	6.38E-01	3.20E+00	6.61E-01	6.61E-01
PCB	Total PCBs	ug/kg dw	66	53	82%	66	Lognormal	7.50E+00	6.38E+01	3.66E+02	9.04E+01	9.04E+01
PEST	Heptachlor epoxide	ug/kg dw	66	16	26%	66	Lognormal	9.00E-02	1.74E+00	3.00E+01	2.04E+00	2.04E+00
PEST	Endosulfan sulfate	ug/kg dw	66	12	18%	40	Normal	9.30E-02	1.42E+00	1.90E+00	1.60E+00	1.60E+00
PEST	Aldrin	ug/kg dw	66	1	2%	66	Lognormal	9.00E-01	1.72E+00	2.30E+01	1.86E+00	1.86E+00
PEST	alpha-BHC	ug/kg dw	66	1	2%	1	NC	2.20E-01	2.20E-01	2.20E-01	NC	2.20E-01
PEST	beta-BHC	ug/kg dw	66	7	11%	66	Lognormal	1.00E-01	6.03E-01	3.80E+00	6.42E-01	6.42E-01
PEST	delta-BHC	ug/kg dw	66	5	8%	5	Normal	8.20E-02	1.58E-01	2.40E-01	2.16E-01	2.16E-01
PEST	Endosulfan II	ug/kg dw	66	1	2%	1	NC	1.00E+00	1.00E+00	1.00E+00	NC	1.00E+00
PEST	4,4'-DDT	ug/kg dw	66	31	48%	66	Lognormal	1.20E-01	6.61E+00	1.40E+02	7.96E+00	7.96E+00
PEST	Alpha Chlordane	ug/kg dw	66	13	20%	66	Lognormal	1.00E-01	2.74E+00	5.40E+01	2.56E+00	2.56E+00
PEST	Gamma Chlordane	ug/kg dw	66	14	22%	66	Lognormal	1.00E-01	4.09E+00	7.60E+01	3.26E+00	3.26E+00
PEST	Endrin ketone	ug/kg dw	66	24	37%	61	Lognormal	1.20E-01	1.61E+00	4.95E+00	2.56E+00	2.56E+00
PEST	gamma-BHC (Lindane)	ug/kg dw	66	2	3%	2	Lognormal	8.70E-02	1.09E-01	1.30E-01	NC	1.30E-01
PEST	Dieldrin	ug/kg dw	65	19	29%	66	Lognormal	8.90E-02	4.26E+00	1.20E+02	3.86E+00	3.86E+00
PEST	Endrin	ug/kg dw	65	4	6%	60	Lognormal	1.00E-01	1.98E+00	6.10E+00	2.31E+00	2.31E+00
PEST	Methoxychlor	ug/kg dw	65	24	37%	62	Lognormal	9.30E-01	8.67E+00	3.60E+01	1.16E+01	1.16E+01
PEST	4,4'-DDD	ug/kg dw	65	5	8%	65	Lognormal	5.60E-01	2.98E+00	3.60E+01	3.01E+00	3.01E+00
PEST	4,4'-DDE	ug/kg dw	65	35	54%	65	Lognormal	8.60E-02	3.21E+00	5.40E+01	4.04E+00	4.04E+00

Appendix C-4.2
Summary Statistics for Floodplain Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilke's Test for Normality(a)	Summary Statistics			95% Upper Confidence Limit	Site Concentration (c)
							Dataset Distribution	Minimum	Mean	Maximum	UCL (b)	
PEST	Endrin aldehyde	ug/kg dw	65	3	5%	60	Lognormal	2.40E-01	1.97E+00	5.06E+00	2.16E+00	2.16E+00
PEST	Heptachlor	ug/kg dw	65	4	6%	65	Lognormal	3.40E-01	2.79E+00	9.10E+01	1.98E+00	1.98E+00
SVOA	bis(2-Ethylhexyl)phthalate	ug/kg dw	65	19	29%	65	Lognormal	2.90E+01	1.04E+02	4.30E+02	1.11E+02	1.11E+02
SVOA	Anthracene	ug/kg dw	65	15	23%	65	Lognormal	2.60E+01	1.58E+02	2.30E+03	1.52E+02	1.52E+02
SVOA	Pyrene	ug/kg dw	65	32	49%	65	Lognormal	7.20E+01	5.33E+02	8.50E+03	4.43E+02	4.43E+02
SVOA	Dibenzofuran	ug/kg dw	65	5	8%	65	Lognormal	4.50E+01	1.09E+02	7.70E+02	1.12E+02	1.12E+02
SVOA	Benzo(g,h,i)perylene	ug/kg dw	65	24	37%	65	Lognormal	3.80E+01	1.97E+02	2.20E+03	2.01E+02	2.01E+02
SVOA	Indeno(1,2,3-cd)pyrene	ug/kg dw	65	18	28%	65	Lognormal	5.10E+01	1.92E+02	2.00E+03	1.95E+02	1.95E+02
SVOA	Benzo(b)fluoranthene	ug/kg dw	65	36	55%	65	Lognormal	2.70E+01	3.03E+02	4.40E+03	2.82E+02	2.82E+02
SVOA	Fluoranthene	ug/kg dw	65	39	60%	65	Lognormal	3.70E+01	6.48E+02	1.00E+04	5.58E+02	5.58E+02
SVOA	Benzo(k)fluoranthene	ug/kg dw	65	26	40%	65	Lognormal	3.70E+01	2.72E+02	3.40E+03	2.49E+02	2.49E+02
SVOA	Acenaphthylene	ug/kg dw	65	4	6%	4	Lognormal	2.40E+01	4.55E+01	7.50E+01	1.74E+02	7.50E+01
SVOA	Chrysene	ug/kg dw	65	41	63%	65	Lognormal	2.80E+01	3.40E+02	4.90E+03	3.19E+02	3.19E+02
SVOA	Benzo(a)pyrene	ug/kg dw	65	26	40%	65	Lognormal	4.30E+01	2.61E+02	3.60E+03	2.26E+02	2.26E+02
SVOA	Dibenzo(a,h)anthracene	ug/kg dw	65	12	18%	65	Lognormal	2.60E+01	8.91E+01	8.10E+02	9.03E+01	9.03E+01
SVOA	Benzo(a)anthracene	ug/kg dw	65	37	57%	65	Lognormal	2.30E+01	2.93E+02	4.30E+03	2.66E+02	2.66E+02
SVOA	Acenaphthene	ug/kg dw	65	9	14%	65	Lognormal	1.60E+01	1.19E+02	1.20E+03	1.24E+02	1.24E+02
SVOA	Diethylphthalate	ug/kg dw	65	1	2%	1	NC	3.90E+01	3.90E+01	3.90E+01	NC	3.90E+01
SVOA	Di-n-butylphthalate	ug/kg dw	65	10	15%	65	Lognormal	3.20E+01	9.46E+01	1.70E+02	1.00E+02	1.00E+02
SVOA	Phenanthrene	ug/kg dw	65	34	52%	65	Lognormal	2.20E+01	4.61E+02	9.20E+03	3.66E+02	3.66E+02
SVOA	Butylbenzylphthalate	ug/kg dw	65	3	5%	65	Lognormal	5.70E+01	9.97E+01	3.40E+02	1.03E+02	1.03E+02
SVOA	Fluorene	ug/kg dw	65	7	11%	65	Lognormal	4.40E+01	1.26E+02	1.40E+03	1.26E+02	1.26E+02
SVOA	Carbazole	ug/kg dw	65	11	17%	65	Lognormal	5.80E+01	1.25E+02	1.00E+03	1.27E+02	1.27E+02
SVOA	Pentachlorophenol	ug/kg dw	65	36	55%	65	Lognormal	2.21E+02	2.67E+02	7.40E+02	2.78E+02	2.78E+02
SVOA	Naphthalene	ug/kg dw	65	2	3%	2	Normal	4.10E+01	6.00E+01	7.90E+01	1.80E+02	7.90E+01
SVOA	2-Methylnaphthalene	ug/kg dw	65	3	5%	3	Lognormal	6.15E+01	6.62E+01	7.20E+01	NC	7.20E+01
VOA	Ethylbenzene	ug/kg dw	65	1	2%	47	Normal	2.05E+00	2.73E+00	3.00E+00	2.78E+00	2.78E+00
VOA	Toluene	ug/kg dw	65	13	20%	65	Lognormal	2.05E+00	3.19E+00	1.20E+01	3.34E+00	3.34E+00
VOA	Chlorobenzene	ugkg dw	65	1	2%	64	Lognormal	2.05E+00	2.88E+00	4.00E+00	2.95E+00	2.95E+00
VOA	Xylenes, Total	ug/kg dw	65	1	2%	65	Lognormal	2.05E+00	2.91E+00	4.20E+00	2.99E+00	2.99E+00
VOA	2-Hexanone	ug/kg dw	65	3	5%	3	Normal	4.80E+00	6.10E+00	6.90E+00	8.01E+00	6.90E+00
VOA	Acetone	ug/kg dw	65	32	49%	65	Lognormal	2.05E+01	1.77E+02	6.70E+02	2.83E+02	2.83E+02
VOA	Benzene	ug/kg dw	65	5	8%	65	Lognormal	1.80E+00	2.88E+00	4.80E+00	2.97E+00	2.97E+00
VOA	Methylene chloride (Dichloromethane)	ug/kg dw	65	3	5%	6	Normal	1.80E+00	2.16E+00	2.40E+00	2.36E+00	2.36E+00
VOA	Carbon disulfide	ug/kg dw	65	3	5%	65	Lognormal	2.05E+00	2.90E+00	4.30E+00	2.98E+00	2.98E+00
VOA	2-Butanone (MEK)	ug/kg dw	65	23	35%	65	Lognormal	9.10E+00	1.93E+01	4.70E+01	2.09E+01	2.09E+01
VOA	Trichloroethene	ug/kg dw	65	4	6%	65	Lognormal	2.05E+00	2.97E+00	6.20E+00	3.07E+00	3.07E+00

Appendix C-4.3
Summary Statistics for Site Q Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilk's Test for Normality (a)	Summary Statistics			95% Upper Confidence Limit	
							Dataset Distribution	Minimum	Mean	Maximum	UCL (b)	Site Concentration (c)
8280A	1998 Total TEQ w/ EMPC as ND	ug/kg	4	4	100%	4	Lognormal	8.13E-04	3.06E-03	8.35E-03	1.32E+00	8.35E-03
METALS	Aluminum	mg/kg dw	4	4	100%	4	Normal	9.30E+03	1.30E+04	1.60E+04	1.60E+04	1.60E+04
METALS	Iron	mg/kg dw	4	4	100%	4	Normal	1.60E+04	1.84E+04	2.00E+04	2.06E+04	2.00E+04
METALS	Lead	mg/kg dw	4	4	100%	4	Lognormal	1.10E+01	1.30E+01	1.60E+01	1.83E+01	1.60E+01
METALS	Magnesium	mg/kg dw	4	4	100%	4	Lognormal	3.30E+03	4.08E+03	4.90E+03	5.52E+03	4.90E+03
METALS	Manganese	mg/kg dw	4	4	100%	4	Normal	2.60E+02	5.44E+02	7.40E+02	7.80E+02	7.40E+02
METALS	Mercury	mg/kg dw	4	4	100%	4	Normal	1.60E-02	2.45E-02	2.90E-02	3.23E-02	2.90E-02
METALS	Molybdenum	mg/kg dw	4	4	100%	4	Lognormal	3.80E-01	6.19E-01	7.80E-01	9.75E-01	7.80E-01
METALS	Nickel	mg/kg dw	4	4	100%	4	Lognormal	1.70E+01	1.90E+01	2.15E+01	2.17E+01	2.15E+01
METALS	Potassium	mg/kg dw	4	4	100%	4	Lognormal	1.20E+03	1.45E+03	1.70E+03	1.87E+03	1.70E+03
METALS	Antimony	mg/kg dw	4	2	50%	2	Normal	6.60E-01	6.95E-01	7.20E-01	9.08E-01	7.20E-01
METALS	Arsenic	mg/kg dw	4	4	100%	4	Normal	6.60E+00	7.19E+00	8.06E+00	8.14E+00	8.06E+00
METALS	Barium	mg/kg dw	4	4	100%	4	Normal	7.90E+01	1.17E+02	1.40E+02	1.40E+02	1.40E+02
METALS	Beryllium	mg/kg dw	4	4	100%	4	Normal	5.10E-01	5.89E-01	6.40E-01	6.57E-01	6.40E-01
METALS	Cadmium	mg/kg dw	4	4	100%	4	Lognormal	1.80E-01	2.60E-01	3.90E-01	5.04E-01	3.90E-01
METALS	Chromium	mg/kg dw	4	4	100%	4	Normal	1.60E+01	1.93E+01	2.20E+01	2.28E+01	2.20E+01
METALS	Cobalt	mg/kg dw	4	4	100%	4	Normal	6.80E+00	7.33E+00	8.60E+00	8.09E+00	8.60E+00
METALS	Copper	mg/kg dw	4	4	100%	4	Lognormal	1.00E+02	1.83E+02	2.90E+02	6.00E+02	2.90E+02
METALS	Vanadium	mg/kg dw	4	4	100%	4	Normal	3.20E+01	3.58E+01	4.00E+01	4.09E+01	4.00E+01
METALS	Zinc	mg/kg dw	4	4	100%	4	Lognormal	5.00E+01	6.09E+01	6.98E+01	NC	6.98E+01
METALS	Calcium	mg/kg dw	4	4	100%	4	Normal	5.10E+03	9.73E+03	1.40E+04	1.40E+04	1.40E+04
PCB	Total PCBs	ug/kg dw	4	2	50%	4	Lognormal	7.90E+00	1.81E+01	4.00E+01	7.79E+02	4.00E+01
PEST	Heptachlor epoxide	ug/kg dw	4	1	25%	1	NC	2.20E-01	2.20E-01	2.20E-01	NC	2.20E-01
PEST	Endosulfan sulfate	ug/kg dw	4	2	50%	2	Normal	1.20E-01	1.50E-01	1.80E-01	3.39E-01	1.80E-01
PEST	delta-BHC	ug/kg dw	4	3	75%	3	Lognormal	5.80E-02	1.03E-01	1.82E-01	3.40E+00	1.82E-01
PEST	Endosulfan II	ug/kg dw	4	1	25%	1	NC	3.40E-01	3.40E-01	3.40E-01	NC	3.40E-01
PEST	4,4'-DDT	ug/kg dw	4	3	75%	3	Lognormal	8.45E-02	1.15E-01	1.60E-01	3.31E-01	1.60E-01
PEST	Alpha Chlordane	ug/kg dw	4	2	50%	2	Normal	1.20E-01	1.90E-01	2.60E-01	6.32E-01	2.60E-01
PEST	Gamma Chlordane	ug/kg dw	4	3	75%	3	Normal	7.70E-02	2.02E-01	3.10E-01	4.00E-01	3.10E-01
PEST	Endrin ketone	ug/kg dw	4	2	50%	2	Normal	7.90E-01	9.10E-01	1.03E+00	1.67E+00	1.03E+00
PEST	Dieldrin	ug/kg dw	4	1	25%	1	NC	8.20E-02	8.20E-02	8.20E-02	NC	8.20E-02
PEST	Endrin	ug/kg dw	4	2	50%	2	Normal	1.40E-01	1.48E-01	1.55E-01	1.96E-01	1.55E-01
PEST	Methoxychlor	ug/kg dw	4	1	25%	1	NC	9.40E-01	9.40E-01	9.40E-01	NC	9.40E-01
PEST	Endrin aldehyde	ug/kg dw	4	2	50%	2	Lognormal	1.20E-01	3.95E-01	6.70E-01	NC	6.70E-01
PEST	Endosulfan I	ug/kg dw	4	1	25%	1	NC	2.20E-01	2.20E-01	2.20E-01	NC	2.20E-01

Appendix C-4.4
Summary Statistics for Site H Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilke's Test for Normality(a)	Summary Statistics			95% Upper Confidence Limit	Site Concentration (c)
							Dataset Distribution	Minimum	Mean	Maximum	UCL (b)	
8280A	1998 Total TEQ w/ EMPC as ND	ug/kg	4	4	100%	4	Lognormal	3.45E-02	5.33E-01	1.29E+00	1.77E+05	1.29E+00
HERB	2,4-DB	ug/kg dw	4	2	50%	4	Normal	4.30E+00	6.74E+00	9.70E+00	9.94E+00	9.70E+00
METALS	Aluminum	mg/kg dw	4	4	100%	4	Lognormal	4.30E+03	7.95E+03	1.40E+04	3.92E+04	1.40E+04
METALS	Iron	mg/kg dw	4	4	100%	4	Normal	1.40E+04	1.63E+04	1.80E+04	1.83E+04	1.80E+04
METALS	Lead	mg/kg dw	4	4	100%	4	Normal	5.30E+01	1.46E+02	2.30E+02	2.44E+02	2.30E+02
METALS	Magnesium	mg/kg dw	4	4	100%	4	Normal	6.90E+02	2.02E+03	2.50E+03	3.07E+03	2.50E+03
METALS	Manganese	mg/kg dw	4	4	100%	4	Normal	9.80E+01	4.37E+02	7.20E+02	7.39E+02	7.20E+02
METALS	Mercury	mg/kg dw	4	4	100%	4	Lognormal	6.40E-02	2.84E-01	7.70E-01	1.42E+02	7.70E-01
METALS	Molybdenum	mg/kg dw	4	4	100%	4	Lognormal	9.80E-01	4.95E+00	1.10E+01	9.82E+02	1.10E+01
METALS	Nickel	mg/kg dw	4	4	100%	4	Lognormal	2.00E+01	3.40E+01	7.00E+01	2.15E+02	7.00E+01
METALS	Potassium	mg/kg dw	4	4	100%	4	Lognormal	8.30E+02	1.16E+03	1.60E+03	1.89E+03	1.60E+03
METALS	Silver	mg/kg dw	4	3	75%	4	Normal	5.10E-01	1.39E+00	2.70E+00	2.64E+00	2.64E+00
METALS	Sodium	mg/kg dw	4	4	100%	4	Normal	1.10E+02	2.48E+02	3.90E+02	3.96E+02	3.90E+02
METALS	Thallium	mg/kg dw	4	1	25%	4	Lognormal	4.70E-01	1.01E+00	2.50E+00	3.00E+01	2.50E+00
METALS	Antimony	mg/kg dw	4	4	100%	4	Normal	6.90E-01	1.57E+00	2.30E+00	2.37E+00	2.30E+00
METALS	Arsenic	mg/kg dw	4	4	100%	4	Lognormal	6.50E+00	2.28E+01	6.40E+01	7.22E+03	6.40E+01
METALS	Barium	mg/kg dw	4	4	100%	4	Normal	9.90E+01	1.12E+02	1.20E+02	1.24E+02	1.20E+02
METALS	Beryllium	mg/kg dw	4	4	100%	4	Lognormal	7.30E-01	1.52E+00	3.80E+00	4.69E+01	3.80E+00
METALS	Cadmium	mg/kg dw	4	4	100%	4	Lognormal	2.70E+00	9.03E+00	2.20E+01	2.17E+03	2.20E+01
METALS	Chromium	mg/kg dw	4	4	100%	4	Normal	1.50E+01	1.95E+01	2.30E+01	2.34E+01	2.30E+01
METALS	Cobalt	mg/kg dw	4	4	100%	4	Lognormal	5.20E+00	1.00E+01	2.00E+01	8.61E+01	2.00E+01
METALS	Copper	mg/kg dw	4	4	100%	4	Normal	2.00E+02	3.75E+02	4.80E+02	5.33E+02	4.80E+02
METALS	Vanadium	mg/kg dw	4	4	100%	4	Lognormal	2.00E+01	3.00E+01	4.50E+01	6.90E+01	4.50E+01
METALS	Zinc	mg/kg dw	4	4	100%	4	Lognormal	3.50E+02	1.28E+03	3.60E+03	6.29E+05	3.60E+03
METALS	Calcium	mg/kg dw	4	4	100%	4	Lognormal	5.90E+03	1.76E+04	4.20E+04	1.07E+06	4.20E+04
METALS	Selenium	mg/kg dw	4	3	75%	4	Lognormal	4.20E-01	1.58E+00	4.70E+00	9.42E+02	4.70E+00
PCB	Total PCBs	ug/kg dw	4	3	75%	4	Normal	8.50E+00	6.60E+02	1.52E+03	1.56E+03	1.52E+03
PEST	Heptachlor epoxide	ug/kg dw	4	3	75%	4	Lognormal	5.90E-01	1.64E+01	4.40E+01	1.11E+12	4.40E+01
PEST	Aldrin	ug/kg dw	4	2	50%	4	Normal	9.00E-01	8.21E+00	2.10E+01	1.94E+01	1.94E+01
PEST	Endosulfan II	ug/kg dw	4	1	25%	3	Lognormal	1.70E+00	3.57E+00	7.20E+00	1.85E+03	7.20E+00
PEST	4,4'-DDT	ug/kg dw	4	3	75%	4	Lognormal	1.70E+00	4.51E+01	1.10E+02	1.17E+10	1.10E+02
PEST	Gamma Chlordane	ug/kg dw	4	2	50%	4	Normal	9.00E-01	1.47E+01	3.00E+01	3.35E+01	3.00E+01
PEST	Endrin ketone	ug/kg dw	4	3	75%	4	Lognormal	1.40E+00	2.50E+01	8.20E+01	1.02E+10	8.20E+01
PEST	Methoxychlor	ug/kg dw	4	2	50%	4	Lognormal	9.00E+00	4.54E+01	1.30E+02	2.00E+05	1.30E+02
PEST	4,4'-DDE	ug/kg dw	4	3	75%	4	Lognormal	1.70E+00	3.44E+01	8.60E+01	8.00E+06	8.60E+01
PEST	Heptachlor	ug/kg dw	4	1	25%	3	Lognormal	9.00E-01	1.28E+00	2.00E+00	8.26E+00	2.00E+00
SVOA	bis(2-Ethylhexyl)phthalate	ug/kg dw	4	2	50%	4	Lognormal	9.00E+01	1.04E+02	1.20E+02	1.26E+02	1.20E+02
SVOA	Pyrene	ug/kg dw	4	3	75%	4	Normal	9.00E+01	1.58E+02	1.90E+02	2.13E+02	1.90E+02
SVOA	Benzo(g,h,i)perylene	ug/kg dw	4	1	25%	4	Lognormal	9.00E+01	1.61E+02	3.70E+02	2.17E+03	3.70E+02
SVOA	Indeno(1,2,3-cd)pyrene	ug/kg dw	4	2	50%	4	Lognormal	8.70E+01	9.18E+01	1.00E+02	NC	1.00E+02
SVOA	Benzo(b)fluoranthene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	1.13E+02	1.40E+02	1.54E+02	1.40E+02
SVOA	Fluoranthene	ug/kg dw	4	3	75%	4	Normal	9.00E+01	1.70E+02	2.40E+02	2.50E+02	2.40E+02
SVOA	Benzo(k)fluoranthene	ug/kg dw	4	3	75%	4	Lognormal	8.20E+01	9.68E+01	1.30E+02	1.37E+02	1.30E+02
SVOA	Chrysene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	1.58E+02	3.00E+02	7.34E+02	3.00E+02
SVOA	Benzo(a)pyrene	ug/kg dw	4	3	75%	4	Normal	4.70E+01	9.93E+01	1.40E+02	1.45E+02	1.40E+02
SVOA	Benzo(a)anthracene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	1.04E+02	1.30E+02	1.33E+02	1.30E+02
SVOA	Phenanthrene	ug/kg dw	4	1	25%	4	Lognormal	9.00E+01	9.63E+01	1.10E+02	NC	1.10E+02
SVOA	Pentachlorophenol	ug/kg dw	4	1	25%	4	Normal	2.25E+02	2.32E+02	2.41E+02	2.41E+02	2.41E+02
VOA	Tetrachloroethene	ug/kg dw	4	1	25%	4	Lognormal	2.55E+00	6.73E+00	1.70E+01	2.98E+02	1.70E+01
VOA	2-Hexanone	ug/kg dw	4	1	25%	1	NC	5.70E+00	5.70E+00	5.70E+00	NC	5.70E+00
VOA	Carbon disulfide	ug/kg dw	4	1	25%	3	Normal	2.55E+00	3.42E+00	4.30E+00	4.89E+00	4.30E+00

Appendix C-4.5
Summary Statistics for Site I Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilk's Test for Normality (a)	Summary Statistics			95% Upper Confidence Limit	Site Concentration (c)
							Dataset Distribution	Minimum	Mean	Maximum	UCL (b)	
8290A	Total TEQ w/ EMPC as ND	ug/kg	4	4	100%	4	Lognormal	7.23E-02	3.34E+00	1.27E+01	5.83E+13	1.27E+01
HERB	2,4-DB	ug/kg dw	4	1	25%	3	Lognormal	4.36E+00	1.27E+01	2.81E+01	8.37E+06	2.81E+01
METALS	Aluminum	mg/kg dw	4	4	100%	4	Lognormal	3.76E+03	5.64E+03	8.00E+03	1.04E+04	8.00E+03
METALS	Iron	mg/kg dw	4	4	100%	4	Normal	5.34E+03	1.08E+04	1.60E+04	1.60E+04	1.60E+04
METALS	Lead	mg/kg dw	4	4	100%	4	Normal	2.20E+02	8.86E+02	1.60E+03	1.41E+03	1.41E+03
METALS	Magnesium	mg/kg dw	4	4	100%	4	Lognormal	7.60E+03	1.24E+04	1.90E+04	2.87E+04	1.90E+04
METALS	Manganese	mg/kg dw	4	4	100%	4	Lognormal	1.60E+02	2.03E+02	3.00E+02	3.56E+02	3.00E+02
METALS	Mercury	mg/kg dw	4	4	100%	4	Lognormal	4.76E-02	8.04E-01	2.00E+00	5.71E+06	2.00E+00
METALS	Molybdenum	mg/kg dw	4	4	100%	4	Normal	2.70E+00	5.90E+00	8.60E+00	8.97E+00	8.60E+00
METALS	Nickel	mg/kg dw	4	4	100%	4	Lognormal	1.45E+01	3.54E+01	6.60E+01	4.40E+02	6.60E+01
METALS	Potassium	mg/kg dw	4	4	100%	4	Lognormal	1.06E+03	1.24E+03	1.60E+03	1.59E+03	1.60E+03
METALS	Silver	mg/kg dw	4	4	100%	4	Lognormal	1.78E+00	8.71E+00	1.90E+01	5.71E+03	1.90E+01
METALS	Sodium	mg/kg dw	4	4	100%	4	Normal	4.40E+02	6.35E+02	8.70E+02	8.80E+02	8.70E+02
METALS	Antimony	mg/kg dw	4	4	100%	4	Lognormal	2.90E+00	6.06E+00	8.40E+00	2.71E+01	8.40E+00
METALS	Arsenic	mg/kg dw	4	4	100%	4	Normal	4.98E+00	7.79E+00	1.20E+01	1.21E+01	1.20E+01
METALS	Barium	mg/kg dw	4	4	100%	4	Lognormal	8.30E+01	2.81E+02	7.40E+02	4.07E+04	7.40E+02
METALS	Beryllium	mg/kg dw	4	4	100%	4	Lognormal	4.80E-01	9.10E-01	1.70E+00	4.05E+00	1.70E+00
METALS	Cadmium	mg/kg dw	4	4	100%	4	Lognormal	2.20E+00	1.12E+01	3.10E+01	4.57E+04	3.10E+01
METALS	Chromium	mg/kg dw	4	4	100%	4	Lognormal	1.30E+01	3.33E+01	6.50E+01	5.57E+02	6.50E+01
METALS	Cobalt	mg/kg dw	4	4	100%	4	Lognormal	2.00E+00	1.21E+01	3.30E+01	1.80E+04	3.30E+01
METALS	Copper	mg/kg dw	4	4	100%	4	Normal	1.66E+03	6.09E+03	1.30E+04	1.34E+04	1.30E+04
METALS	Vanadium	mg/kg dw	4	4	100%	4	Normal	1.07E+01	1.87E+01	2.80E+01	2.63E+01	2.80E+01
METALS	Zinc	mg/kg dw	4	4	100%	4	Lognormal	4.06E+02	1.43E+03	2.80E+03	4.33E+04	2.80E+03
METALS	Calcium	mg/kg dw	4	4	100%	4	Lognormal	9.20E+04	1.57E+05	2.35E+05	4.80E+05	2.35E+05
METALS	Selenium	mg/kg dw	4	3	75%	4	Lognormal	5.50E-01	1.10E+00	1.60E+00	6.80E+00	1.60E+00
PCB	Total PCBs	ug/kg dw	4	3	75%	4	Lognormal	6.10E+01	3.11E+04	1.21E+05	8.78E+26	1.21E+05
PEST	Heptachlor epoxide	ug/kg dw	3	3	100%	3	Lognormal	9.40E-01	4.85E+01	1.40E+02	3.51E+28	1.40E+02
PEST	Endosulfan sulfate	ug/kg dw	3	1	33%	2	Normal	8.60E+00	8.65E+00	8.80E+00	9.60E+00	8.80E+00
PEST	Aldrin	ug/kg dw	3	3	100%	3	Lognormal	8.20E-01	8.48E+01	2.50E+02	2.17E+38	2.50E+02
PEST	Endosulfan II	ug/kg dw	3	3	100%	3	Lognormal	2.28E+00	2.09E+02	6.00E+02	3.87E+35	6.00E+02
PEST	4,4'-DDT	ug/kg dw	3	2	67%	3	Lognormal	2.50E+00	1.57E+02	4.60E+02	3.99E+32	4.60E+02
PEST	Alpha Chlordane	ug/kg dw	3	1	33%	1	NC	2.86E+00	2.85E+00	2.86E+00	NC	2.86E+00
PEST	Gamma Chlordane	ug/kg dw	3	3	100%	3	Lognormal	5.56E+00	1.32E+02	3.80E+02	1.18E+24	3.80E+02
PEST	Endrin ketone	ug/kg dw	3	3	100%	3	Lognormal	3.20E+00	2.42E+02	7.00E+02	1.29E+33	7.00E+02
PEST	Dieldrin	ug/kg dw	3	3	100%	3	Lognormal	1.70E+00	7.04E+01	2.00E+02	8.87E+25	2.00E+02
PEST	Endrin	ug/kg dw	3	3	100%	3	Lognormal	9.10E-01	8.22E+01	2.40E+02	1.44E+35	2.40E+02
PEST	Methoxychlor	ug/kg dw	3	3	100%	3	Lognormal	1.60E+01	1.03E+03	3.00E+03	1.37E+33	3.00E+03
PEST	4,4'-DDD	ug/kg dw	3	3	100%	3	Lognormal	3.10E-01	6.69E+01	2.00E+02	6.19E+66	2.00E+02
PEST	4,4'-DDE	ug/kg dw	3	3	100%	3	Lognormal	1.68E+00	1.03E+02	3.00E+02	1.39E+32	3.00E+02
PEST	Endrin aldehyde	ug/kg dw	3	3	100%	3	Lognormal	4.70E+00	5.10E+02	1.50E+03	5.90E+37	1.50E+03
PEST	Heptachlor	ug/kg dw	3	2	67%	3	Lognormal	8.88E-01	2.49E+01	6.90E+01	3.91E+21	6.90E+01
PEST	Endosulfan I	ug/kg dw	3	3	100%	3	Lognormal	7.20E-01	8.88E+01	2.60E+02	6.21E+38	2.60E+02
SVOA	1,4-Dichlorobenzene	ug/kg dw	4	1	25%	1	NC	4.60E+01	4.60E+01	4.60E+01	NC	4.60E+01
SVOA	4-Chloroaniline	ug/kg dw	4	2	50%	4	Lognormal	1.66E+02	4.04E+03	1.60E+04	3.38E+15	1.60E+04
SVOA	bis(2-Ethylhexyl)phthalate	ug/kg dw	4	1	25%	1	NC	8.75E+01	8.75E+01	8.75E+01	NC	8.75E+01
SVOA	Hexachlorobenzene	ug/kg dw	4	1	25%	4	Lognormal	3.63E+01	5.48E+01	1.10E+02	2.92E+02	1.10E+02
SVOA	Anthracene	ug/kg dw	4	2	50%	4	Lognormal	2.86E+01	2.36E+02	7.30E+02	3.37E+06	7.30E+02
SVOA	1,2,4-Trichlorobenzene	ug/kg dw	4	1	25%	4	Lognormal	6.60E+01	1.11E+02	1.80E+02	2.38E+02	1.80E+02
SVOA	2,4-Dichlorophenol	ug/kg dw	4	1	25%	1	NC	8.20E+01	8.20E+01	8.20E+01	NC	8.20E+01
SVOA	Pyrene	ug/kg dw	4	4	100%	4	Lognormal	1.40E+02	1.35E+03	4.70E+03	1.14E+09	4.70E+03
SVOA	Dibenzofuran	ug/kg dw	4	1	25%	4	Normal	8.50E+01	9.25E+01	1.00E+02	1.00E+02	1.00E+02
SVOA	Benzo(g,h,i)perylene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	4.66E+02	1.60E+03	5.62E+06	1.60E+03
SVOA	Indeno(1,2,3-cd)pyrene	ug/kg dw	4	2	50%	4	Lognormal	9.00E+01	4.64E+02	1.60E+03	7.64E+06	1.60E+03
SVOA	Benzo(b)fluoranthene	ug/kg dw	4	3	75%	4	Lognormal	9.50E+01	8.14E+02	2.80E+03	4.06E+08	2.80E+03
SVOA	Fluoranthene	ug/kg dw	4	4	100%	4	Lognormal	1.20E+02	1.66E+03	6.00E+03	2.32E+10	6.00E+03
SVOA	Benzo(k)fluoranthene	ug/kg dw	4	3	75%	4	Lognormal	5.50E+01	3.10E+02	9.60E+02	1.06E+06	9.60E+02
SVOA	Chrysene	ug/kg dw	4	3	75%	4	Lognormal	9.50E+01	6.62E+02	2.20E+03	5.53E+07	2.20E+03
SVOA	Benzo(a)pyrene	ug/kg dw	4	3	75%	4	Lognormal	4.95E+01	6.29E+02	2.20E+03	2.97E+09	2.20E+03
SVOA	Dibenzo(a,h)anthracene	ug/kg dw	4	2	50%	4	Lognormal	3.65E+01	1.23E+02	3.60E+02	4.44E+04	3.60E+02

Appendix C-4.5
Summary Statistics for Site I Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilke's Test for Normality(a)	Summary Statistics			95% Upper Confidence Limit	Site Concentration (c)
							Dataset Distribution	Minimum	Mean	Maximum	UCL (b)	
SVOA	Benzo(a)anthracene	ug/kg dw	4	3	75%	4	Lognormal	7.80E+01	6.53E+02	2.20E+03	1.36E+08	2.20E+03
SVOA	Di-n-butylphthalate	ug/kg dw	4	1	25%	1	NC	5.20E+01	5.20E+01	5.20E+01	NC	5.20E+01
SVOA	Phenanthrene	ug/kg dw	4	4	100%	4	Lognormal	5.00E+01	8.80E+02	3.30E+03	3.21E+11	3.30E+03
SVOA	Fluorene	ug/kg dw	4	1	25%	4	Lognormal	8.50E+01	1.25E+02	2.30E+02	4.33E+02	2.30E+02
SVOA	Carbazole	ug/kg dw	4	1	25%	4	Lognormal	8.50E+01	1.48E+02	3.20E+02	1.30E+03	3.20E+02
SVOA	Pentachlorophenol	ug/kg dw	4	4	100%	4	Lognormal	2.20E+02	6.34E+02	1.65E+03	6.33E+04	1.65E+03
SVOA	2-Nitroaniline	ug/kg dw	4	1	25%	1	NC	1.60E+02	1.60E+02	1.60E+02	NC	1.60E+02
VOA	Toluene	ug/kg dw	4	1	25%	4	Normal	2.35E+00	2.89E+00	3.30E+00	3.39E+00	3.30E+00

Appendix C-4.6
Summary Statistics for Site L Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilk's Test for Normality(a)	Summary Statistics			95% Upper Confidence Limit	Site Concentration (c)
							Dataset Distribution	Minimum	Mean	Maximum	UCL (b)	
8290A	1998 Total TEQ w/ EMPC as ND	ug/kg	4	4	100%	4	Lognormal	9.33E-02	3.60E-01	8.21E-01	1.26E+02	8.21E-01
METALS	Cyanide, Total	mg/kg dw	4	1	25%	4	Lognormal	2.70E-01	6.06E-01	1.60E+00	3.88E+01	1.60E+00
METALS	Aluminum	mg/kg dw	4	4	100%	4	Normal	3.60E+03	6.76E+03	7.60E+03	7.88E+03	7.60E+03
METALS	Iron	mg/kg dw	4	4	100%	4	Normal	7.10E+03	2.30E+04	3.20E+04	3.61E+04	3.20E+04
METALS	Lead	mg/kg dw	4	4	100%	4	Lognormal	8.40E+01	3.89E+02	9.40E+02	2.64E+06	9.40E+02
METALS	Magnesium	mg/kg dw	4	4	100%	4	Normal	3.40E+02	2.49E+03	4.20E+03	4.45E+03	4.20E+03
METALS	Manganese	mg/kg dw	4	4	100%	4	Normal	2.30E+01	3.51E+02	6.50E+02	6.76E+02	6.50E+02
METALS	Mercury	mg/kg dw	4	4	100%	4	Normal	3.90E-02	3.72E-01	6.60E-01	6.74E-01	6.60E-01
METALS	Molybdenum	mg/kg dw	4	4	100%	4	Lognormal	9.30E+00	1.40E+01	2.30E+01	4.29E+01	2.30E+01
METALS	Nickel	mg/kg dw	4	4	100%	4	Normal	3.80E+01	4.06E+01	5.50E+01	5.58E+01	5.50E+01
METALS	Potassium	mg/kg dw	4	4	100%	4	Normal	6.00E+02	1.09E+03	1.70E+03	1.88E+03	1.88E+03
METALS	Silver	mg/kg dw	4	3	75%	4	Lognormal	6.60E-01	8.13E-01	1.20E+00	1.57E+00	1.20E+00
METALS	Sodium	mg/kg dw	4	4	100%	4	Lognormal	2.10E+02	3.45E+02	6.40E+02	1.06E+03	6.40E+02
METALS	Thallium	mg/kg dw	4	4	100%	4	Normal	1.60E+00	1.80E+00	2.10E+00	2.09E+00	2.09E+00
METALS	Antimony	mg/kg dw	4	4	100%	4	Lognormal	2.00E+00	1.28E+00	6.40E+00	8.86E+00	6.40E+00
METALS	Arsenic	mg/kg dw	4	4	100%	4	Lognormal	3.00E+01	1.13E+01	3.70E+01	NC	3.70E+01
METALS	Barium	mg/kg dw	4	4	100%	4	Normal	6.30E+01	1.71E+02	2.60E+02	2.66E+02	2.60E+02
METALS	Beryllium	mg/kg dw	4	4	100%	4	Lognormal	1.40E+00	1.48E+00	1.60E+00	NC	1.60E+00
METALS	Cadmium	mg/kg dw	4	4	100%	4	Normal	7.10E-01	5.60E+00	1.00E+01	1.02E+01	1.00E+01
METALS	Chromium	mg/kg dw	4	4	100%	4	Lognormal	1.70E+01	4.53E+01	7.90E+01	4.49E+02	7.90E+01
METALS	Cobalt	mg/kg dw	4	4	100%	4	Lognormal	1.10E+01	1.38E+01	1.70E+01	1.90E+01	1.70E+01
METALS	Copper	mg/kg dw	4	4	100%	4	Lognormal	1.90E+02	1.76E+03	4.70E+03	7.41E+07	4.70E+03
METALS	Vanadium	mg/kg dw	4	4	100%	4	Lognormal	3.00E+01	4.43E+01	4.90E+01	5.30E+01	4.90E+01
METALS	Zinc	mg/kg dw	4	4	100%	4	Normal	1.60E+02	5.10E+02	8.70E+02	8.61E+02	8.61E+02
METALS	Calcium	mg/kg dw	4	4	100%	4	Normal	2.80E+03	2.00E+04	2.90E+04	1.42E+04	2.90E+04
METALS	Selenium	mg/kg dw	4	4	100%	4	Lognormal	1.80E+00	1.09E+00	4.30E+00	9.00E+00	4.30E+00
PCB	Total PCBs	ug/kg dw	4	2	50%	4	Normal	9.00E+00	4.90E+02	1.17E+03	1.07E+03	1.07E+03
PEST	Heptachlor epoxide	ug/kg dw	4	3	75%	4	Normal	9.00E-01	5.85E+00	9.20E+00	1.05E+01	9.20E+00
PEST	Aldrin	ug/kg dw	4	1	25%	4	Normal	9.00E-01	3.03E+00	5.50E+00	6.19E+00	5.50E+00
PEST	beta-BHC	ug/kg dw	4	1	25%	4	Lognormal	2.50E-01	1.60E+00	3.70E+00	1.30E+03	3.70E+00
PEST	4,4'-DDT	ug/kg dw	4	1	25%	4	Normal	1.80E+00	8.95E+00	1.60E+01	1.58E+01	1.58E+01
PEST	Gamma Chlordane	ug/kg dw	4	3	75%	4	Normal	9.00E-01	1.19E+01	2.10E+01	2.13E+01	2.10E+01
PEST	Endrin ketone	ug/kg dw	4	3	75%	4	Lognormal	1.80E+00	1.21E+01	2.80E+01	1.23E+04	2.80E+01
PEST	Dieldrin	ug/kg dw	4	1	25%	4	Normal	1.80E+00	7.83E+00	1.20E+01	1.29E+01	1.20E+01
PEST	Methoxychlor	ug/kg dw	4	2	50%	3	Normal	9.00E+00	2.83E+01	4.80E+01	5.77E+01	4.80E+01
PEST	4,4'-DDE	ug/kg dw	4	3	75%	4	Normal	1.80E+00	1.10E+01	2.00E+01	1.07E+01	1.07E+01
SVOA	bis(2-Ethylhexyl)phthalate	ug/kg dw	4	2	50%	4	Lognormal	9.00E+01	1.90E+02	3.10E+02	7.09E+02	3.10E+02
SVOA	Anthracene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	1.06E+03	3.80E+03	9.95E+08	3.80E+03
SVOA	Pyrene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	4.27E+03	1.30E+04	4.86E+13	1.30E+04
SVOA	Dibenzofuran	ug/kg dw	4	1	25%	4	Lognormal	9.00E+01	2.86E+02	7.60E+02	8.24E+04	7.60E+02
SVOA	*Benzo(g,h,i)perylene*	*ug/kg dw*	*4*	*3*	*75%*	*4*	*Lognormal*	*9.00E+01*	*1.33E+03*	*3.80E+03*	*1.14E+09*	*3.80E+03*
SVOA	Indeno(1,2,3-cd)pyrene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	1.68E+03	4.80E+03	7.61E+09	4.80E+03
SVOA	Benzo(b)fluoranthene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	2.19E+03	6.60E+03	7.02E+10	6.60E+03
SVOA	Fluoranthene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	5.77E+03	1.80E+04	1.67E+15	1.80E+04
SVOA	Benzo(k)fluoranthene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	2.29E+03	6.80E+03	2.12E+11	6.80E+03
SVOA	Chrysene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	2.64E+03	7.80E+03	3.67E+11	7.80E+03
SVOA	Benzo(a)pyrene	ug/kg dw	4	3	75%	4	Lognormal	4.90E+01	2.30E+03	7.00E+03	3.48E+13	7.00E+03
SVOA	Dibenzo(a,h)anthracene	ug/kg dw	4	2	50%	4	Lognormal	4.90E+01	4.05E+02	1.30E+03	5.84E+08	1.30E+03
SVOA	Benzo(a)anthracene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	2.56E+03	7.80E+03	3.26E+11	7.80E+03
SVOA	Acenaphthene	ug/kg dw	4	2	50%	4	Lognormal	9.00E+01	4.81E+02	1.60E+03	8.49E+06	1.60E+03
SVOA	Phenanthrene	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	3.62E+03	1.20E+04	7.19E+12	1.20E+04
SVOA	*Fluorene*	*ug/kg dw*	*4*	*2*	*50%*	*4*	*Lognormal*	*9.00E+01*	*4.21E+02*	*1.40E+03*	*8.22E+06*	*1.40E+03*
SVOA	Carbazole	ug/kg dw	4	3	75%	4	Lognormal	9.00E+01	4.80E+02	1.50E+03	1.62E+06	1.50E+03
SVOA	Pentachlorophenol	ug/kg dw	4	1	25%	3	Normal	2.35E+02	2.38E+02	2.40E+02	2.43E+02	2.40E+02
SVOA	Naphthalene	ug/kg dw	4	1	25%	4	Lognormal	9.00E+01	1.49E+02	3.20E+02	1.22E+03	3.20E+02
SVOA	2-Methylnaphthalene	ug/kg dw	4	1	25%	4	Lognormal	9.00E+01	1.04E+02	1.40E+02	1.47E+02	1.40E+02
VOA	Toluene	ug/kg dw	4	1	25%	4	Lognormal	3.15E+00	6.08E+00	1.30E+01	6.23E+01	1.30E+01

Appendix C-4.7
Summary Statistics for Site N Surface Soil
Sauget Area I

Method	Constituent	Units	Number of Samples Analyzed	Number of Detects	Frequency of Detection	Number of Samples for Statistics	Shapiro-Wilke's Test for Normality(a)	Summary Statistics			95% Upper Confidence Limit	Site Concentration (c)
							Dataset Distribution	Minimum	Mean	Maximum	UCL (b)	
8280A	1998 Total TEQ w/ EMPC as ND	ug/kg	4	4	100%	4	Lognormal	3.90E-03	9.76E-02	3.45E-01	2.91E+07	3.45E-01
METALS	Aluminum	mg/kg dw	4	4	100%	4	Lognormal	7.50E+03	8.75E+03	1.10E+04	1.14E+04	1.10E+04
METALS	Iron	mg/kg dw	4	4	100%	4	Normal	1.30E+04	1.43E+04	1.50E+04	1.54E+04	1.50E+04
METALS	Lead	mg/kg dw	4	4	100%	4	Lognormal	1.90E+01	1.38E+02	4.10E+02	5.63E+06	4.10E+02
METALS	Magnesium	mg/kg dw	4	4	100%	4	Lognormal	5.20E+03	7.18E+03	1.15E+04	1.59E+04	1.15E+04
METALS	Manganese	mg/kg dw	4	4	100%	4	Normal	2.80E+02	3.74E+02	4.10E+02	4.47E+02	4.10E+02
METALS	Mercury	mg/kg dw	4	4	100%	4	Lognormal	3.10E-02	6.78E-02	9.50E-02	3.52E-01	9.50E-02
METALS	Molybdenum	mg/kg dw	4	4	100%	4	Lognormal	7.00E-01	1.03E+00	1.45E+00	1.82E+00	1.45E+00
METALS	Nickel	mg/kg dw	4	4	100%	4	Normal	1.50E+01	1.61E+01	1.70E+01	1.71E+01	1.70E+01
METALS	Potassium	mg/kg dw	4	4	100%	4	Normal	1.20E+03	1.40E+03	1.60E+03	1.61E+03	1.60E+03
METALS	Antimony	mg/kg dw	4	1	25%	1	NC	7.10E-01	7.10E-01	7.10E-01	NC	7.10E-01
METALS	Arsenic	mg/kg dw	4	4	100%	4	Lognormal	5.50E+00	6.33E+00	7.30E+00	7.47E+00	7.30E+00
METALS	Barium	mg/kg dw	4	4	100%	4	Normal	1.40E+02	5.93E+02	1.20E+03	1.21E+03	1.20E+03
METALS	Cadmium	mg/kg dw	4	4	100%	4	Lognormal	3.00E-01	8.46E-01	1.50E+00	1.18E+01	1.50E+00
METALS	Chromium	mg/kg dw	4	4	100%	4	Lognormal	1.20E+01	1.65E+01	1.80E+01	2.29E+01	1.80E+01
METALS	Cobalt	mg/kg dw	4	4	100%	4	Lognormal	5.60E+00	5.84E+00	6.15E+00	NC	6.15E+00
METALS	Copper	mg/kg dw	4	4	100%	4	Lognormal	1.60E+01	5.01E+01	1.10E+02	2.28E+03	1.10E+02
METALS	Vanadium	mg/kg dw	4	4	100%	4	Lognormal	2.10E+01	2.38E+01	2.90E+01	2.94E+01	2.90E+01
METALS	Zinc	mg/kg dw	4	4	100%	4	Normal	6.20E+01	1.49E+02	2.50E+02	2.61E+02	2.50E+02
METALS	Calcium	mg/kg dw	4	4	100%	4	Lognormal	1.60E+04	5.73E+04	1.09E+05	1.99E+06	1.09E+05
METALS	Selenium	mg/kg dw	4	1	25%	4	Lognormal	4.95E-01	5.69E-01	6.80E-01	6.91E-01	6.80E-01
PCB	Total PCBs	ug/kg dw	4	1	25%	4	Lognormal	9.00E+00	5.13E+01	1.78E+02	5.08E+06	1.78E+02
PEST	Aldrin	ug/kg dw	4	1	25%	3	Normal	9.00E-01	1.03E+00	1.28E+00	1.39E+00	1.28E+00
PEST	beta-BHC	ug/kg dw	4	1	25%	3	Lognormal	2.70E-01	2.93E-01	3.38E-01	3.82E-01	3.38E-01
PEST	4,4'-DDT	ug/kg dw	4	1	25%	4	Lognormal	1.75E+00	2.02E+00	2.70E+00	2.82E+00	2.70E+00
PEST	Alpha Chlordane	ug/kg dw	4	1	25%	3	Normal	9.00E-01	9.67E-01	1.10E+00	1.16E+00	1.10E+00
PEST	Gamma Chlordane	ug/kg dw	4	1	25%	4	Lognormal	9.00E-01	1.38E+00	1.85E+00	3.73E+00	1.85E+00
PEST	Dieldrin	ug/kg dw	4	1	25%	3	Lognormal	1.75E+00	1.89E+00	2.13E+00	2.33E+00	2.13E+00
PEST	Methoxychlor	ug/kg dw	4	1	25%	4	Lognormal	9.00E+00	2.06E+01	5.50E+01	1.40E+03	5.50E+01
SVOA	bis(2-Ethylhexyl)phthalate	ug/kg dw	4	1	25%	4	Lognormal	9.00E+01	1.01E+02	1.30E+02	1.33E+02	1.30E+02
SVOA	Anthracene	ug/kg dw	4	3	75%	3	Normal	3.60E+01	4.70E+01	5.80E+01	6.55E+01	5.80E+01
SVOA	Pyrene	ug/kg dw	4	4	100%	4	Normal	1.50E+02	3.41E+02	5.50E+02	5.51E+02	5.50E+02
SVOA	Benzo(g,h,i)perylene	ug/kg dw	4	1	25%	4	Lognormal	9.00E+01	1.44E+02	3.00E+02	9.66E+02	3.00E+02
SVOA	Indeno(1,2,3-cd)pyrene	ug/kg dw	4	3	75%	4	Lognormal	8.75E+01	1.44E+02	2.50E+02	5.70E+02	2.50E+02
SVOA	Benzo(b)fluoranthene	ug/kg dw	4	4	100%	4	Lognormal	5.90E+01	1.65E+02	3.20E+02	3.55E+03	3.20E+02
SVOA	Fluoranthene	ug/kg dw	4	4	100%	4	Normal	1.70E+02	3.93E+02	6.10E+02	6.27E+02	6.10E+02
SVOA	Benzo(k)fluoranthene	ug/kg dw	4	4	100%	4	Normal	8.00E+01	2.18E+02	3.80E+02	3.70E+02	3.80E+02
SVOA	Chrysene	ug/kg dw	4	4	100%	4	Lognormal	8.80E+01	2.00E+02	3.10E+02	1.43E+03	3.10E+02
SVOA	Benzo(a)pyrene	ug/kg dw	4	4	100%	4	Lognormal	7.20E+01	1.87E+02	3.30E+02	2.74E+03	3.30E+02
SVOA	Dibenzo(a,h)anthracene	ug/kg dw	4	2	50%	4	Normal	4.90E+01	7.25E+01	1.10E+02	1.07E+02	1.07E+02
SVOA	Benzo(a)anthracene	ug/kg dw	4	4	100%	4	Normal	7.00E+01	1.68E+02	2.70E+02	2.77E+02	2.70E+02
SVOA	Phenanthrene	ug/kg dw	4	4	100%	4	Normal	8.00E+01	1.76E+02	2.60E+02	2.63E+02	2.60E+02
SVOA	Pentachlorophenol	ug/kg dw	4	4	100%	4	Lognormal	2.32E+02	3.07E+02	4.74E+02	6.13E+02	4.74E+02

Appendix C-4.8
Summary Statistics for Site G Subsurface Soil
Sauget Area I

Constituent	Number of Samples for Statistics (a)	Shapiro-Wilk's Test for Normality: Dataset Distribution	Summary Statistics (mg/kg): Minimum	Mean	Maximum	95% UCL (mg/kg): UCL	Site Concentration (mg/kg)
1,1,2,2-Tetrachloroethane	1	NC	5.81E-01	5.81E-01	5.81E-01	NC	5.81E-01
1,2,4-Trichlorobenzene	4	Lognormal	7.87E+00	6.16E+01	1.20E+02	2.19E+05	1.20E+02
1,2-Dichloroethane	1	NC	4.35E-01	4.35E-01	4.35E-01	NC	4.35E-01
1,4-Dichlorobenzene	2	Lognormal	2.38E+00	2.97E+00	3.56E+00	NC	3.56E+00
2,4,6-Trichlorophenol	1	NC	4.95E+01	4.95E+01	4.95E+01	NC	4.95E+01
2,4-Dichlorophenol	3	Lognormal	1.41E+01	6.45E+01	1.41E+02	5.17E+07	1.41E+02
2,4-Dinitrophenol	1	NC	1.40E+01	1.40E+01	1.40E+01	NC	1.40E+01
2-Butanone (MEK)	11	Normal	2.20E-02	7.39E+00	1.78E+01	1.08E+01	1.08E+01
2-Chlorophenol	1	NC	8.76E+00	8.76E+00	8.76E+00	NC	8.76E+00
2-Methylnapthalene	4	Lognormal	8.71E+00	1.84E+01	3.71E+01	1.04E+02	3.71E+01
2-Methylphenol(o-cresol)	1	NC	3.56E+00	3.56E+00	3.56E+00	NC	3.56E+00
4,4'-DDE	4	Lognormal	3.07E+00	4.88E+01	1.35E+02	1.85E+08	1.35E+02
4-Chloroaniline	3	Lognormal	5.97E+00	8.16E+01	2.31E+02	4.20E+22	2.31E+02
4-Methyl-2-pentanone	4	Lognormal	6.35E-01	2.99E+00	6.00E+00	5.54E+02	6.00E+00
Acenapthene	1	NC	2.67E+00	2.67E+00	2.67E+00	NC	2.67E+00
Acetone	11	Normal	3.20E-02	5.66E+00	1.54E+01	8.44E+00	8.44E+00
Aluminum	13	Normal	9.66E+02	8.17E+03	1.87E+04	1.08E+04	1.08E+04
Anthracene	1	NC	8.49E+00	8.49E+00	8.49E+00	NC	8.49E+00
Arsenic	5	Lognormal	2.50E+00	5.52E+00	1.11E+01	1.37E+01	1.11E+01
Barium	13	Lognormal	1.17E+02	5.00E+03	4.59E+04	4.18E+04	4.18E+04
Benzene	6	Normal	3.00E-03	1.53E+01	4.53E+01	2.88E+01	4.53E+01
Benzyl alcohol	1	NC	6.10E+00	6.10E+00	6.10E+00	NC	6.10E+00
Butyl benzyl phthalate	1	NC	2.33E+01	2.33E+01	2.33E+01	NC	2.33E+01
Pentachlorophenol(PCP)	5	Lognormal	2.35E+01	1.32E+03	4.77E+03	3.34E+07	4.77E+03
Cadmium	3	Lognormal	2.00E+00	7.00E+00	1.40E+01	6.65E+04	1.40E+01
Calcium	2	Lognormal	1.61E+04	1.73E+04	1.85E+04	NC	1.85E+04
Chlorobenzene	8	Lognormal	1.07E-01	1.08E+02	5.38E+02	1.18E+06	5.38E+02
Chloroform	1	NC	1.16E+01	1.16E+01	1.16E+01	NC	1.16E+01
Chromium	13	Lognormal	5.00E+00	9.36E+01	9.85E+02	2.28E+02	2.28E+02
Chrysene	1	NC	2.29E+01	2.29E+01	2.29E+01	NC	2.29E+01
Cobalt	6	Lognormal	8.70E+00	2.05E+01	5.60E+01	5.25E+01	5.60E+01
Copper	20	Lognormal	8.00E+00	1.73E+02	2.22E+03	3.24E+02	3.24E+02
Di-N-butyl phthalate	4	Lognormal	2.79E-01	8.92E+00	1.76E+01	2.10E+11	1.76E+01
Dibenzofuran	2	Normal	4.30E+00	1.91E+01	3.38E+01	1.12E+02	3.38E+01
Diethylphthalate	1	NC	2.29E+01	2.29E+01	2.29E+01	NC	2.29E+01
Ethylbenzene	6	Lognormal	1.64E-01	6.80E+00	1.89E+01	7.35E+03	1.89E+01
Fluoranthene	1	NC	6.59E+00	6.59E+00	6.59E+00	NC	6.59E+00
Fluorene	1	NC	1.13E+01	1.13E+01	1.13E+01	NC	1.13E+01
Hexachlorobenzene	2	Lognormal	2.79E+01	3.43E+01	4.06E+01	NC	4.06E+01
Iron	22	Lognormal	4.06E+03	1.35E+04	5.37E+04	1.73E+04	1.73E+04
Lead	18	Lognormal	3.00E+00	2.41E+02	3.12E+03	7.30E+02	7.30E+02
Magnesium	2	Lognormal	7.16E+03	7.31E+03	7.46E+03	NC	7.46E+03
Manganese	11	Normal	4.30E+01	2.09E+02	4.61E+02	2.75E+02	2.75E+02
Mercury	4	Lognormal	2.00E-02	8.66E+00	3.43E+01	3.78E+21	3.43E+01
Methylene chloride	11	Lognormal	3.00E-03	1.63E+00	7.11E+00	4.29E+03	7.11E+00
N-Nitrosodiphenylamine	1	NC	1.78E+02	1.78E+02	1.78E+02	NC	1.78E+02
Napthalene	7	Lognormal	4.83E+00	8.93E+02	5.43E+03	9.78E+06	5.43E+03
Nickel	19	Lognormal	8.00E+00	5.13E+01	3.99E+02	7.98E+01	7.98E+01
Phenanthrene	4	Lognormal	1.29E+01	2.84E+01	5.14E+01	1.18E+02	5.14E+01
Phenol	1	NC	1.78E+02	1.78E+02	1.78E+02	NC	1.78E+02
Phosphorus	9	Lognormal	1.83E+02	5.37E+02	1.34E+03	8.98E+02	8.98E+02
Potassium	2	Normal	1.47E+03	1.59E+03	1.70E+03	2.31E+03	1.70E+03
Pyrene	2	Lognormal	7.56E+00	1.33E+01	1.91E+01	NC	1.91E+01
Silver	1	NC	1.20E+01	1.20E+01	1.20E+01	NC	1.20E+01
Total PCBs	7	Lognormal	1.30E-01	5.08E+02	4.43E+03	6.93E+16	4.43E+03
Tetrachloroethene	8	Normal	9.00E-03	1.88E+01	5.86E+01	3.30E+01	3.30E+01
Tin	2	Lognormal	2.60E+01	5.30E+01	8.00E+01	NC	8.00E+01
Toluene	6	Normal	4.06E-01	4.85E+01	1.18E+02	8.71E+01	1.18E+02
Total Xylenes	5	Lognormal	9.20E-02	1.64E+01	4.15E+01	1.36E+06	4.15E+01
Trichloroethene	4	Lognormal	7.62E-01	1.94E+00	3.85E+00	1.85E+01	3.85E+00
Vanadium	11	Lognormal	1.40E+01	1.49E+02	1.32E+03	4.44E+02	4.44E+02
Zinc	19	Lognormal	2.70E+01	4.75E+02	4.26E+03	1.02E+03	1.02E+03
trans-1,2-Dichloroethene	1	NC	7.00E-01	7.00E-01	7.00E-01	NC	7.00E-01

(a) - Only concentrations reported as detected by the laboratory were used in the calculation of statistics for subsurface soil

Appendix C-4.9
Summary Statistics for Site H Subsurface Soil
Sauget Area I

Constituent	Number of Samples for Statistics (a)	Shapiro-Wilke's Test for Normality: Dataset Distribution	Summary Statistics (mg/kg): Minimum	Mean	Maximum	95% UCL (mg/kg): UCL	Site Concentration (mg/kg)
1,2,4-Trichlorobenzene	6	Lognormal	6.10E-02	1.33E+03	7.58E+03	4.42E+22	7.58E+03
1,2-Dichlorobenzene	3	Lognormal	5.48E-01	6.48E+03	1.94E+04	1.38E+134	1.94E+04
1,2-Dichloroethane	1	NC	1.20E-02	1.20E-02	1.20E-02	NC	1.20E-02
1,3-Dichlorobenzene	3	Lognormal	7.65E+00	8.76E+01	2.42E+02	1.28E+17	2.42E+02
1,4-Dichlorobenzene	5	Lognormal	6.20E-02	6.32E+03	3.06E+04	8.14E+38	3.06E+04
2,4,6-Trichlorophenol	2	NC	1.79E-01	3.07E+02	6.13E+02	NC	6.13E+02
2,4-Dichlorophenol	5	Lognormal	1.67E-01	1.50E+02	7.42E+02	2.30E+17	7.42E+02
2,4-Dimethylphenol	1	NC	9.20E-02	9.20E-02	9.20E-02	NC	9.20E-02
2-Butanone (MEK)	5	Normal	3.30E-02	1.26E+01	2.72E+01	2.51E+01	2.72E+01
2-Methylnapthalene	3	Lognormal	1.56E-01	1.16E+02	3.47E+02	1.00E+82	3.47E+02
4,4'-DDE	2	Normal	5.04E-01	6.42E-01	7.80E-01	1.51E+00	7.80E-01
4,4'-DDT	2	Normal	7.80E-01	8.52E-01	9.23E-01	1.30E+00	9.23E-01
4-4'-DDD	1	NC	4.31E-01	4.31E-01	4.31E-01	NC	4.31E-01
4-Methyl-2-pentanone	4	Lognormal	9.00E-03	2.33E+00	7.85E+00	1.90E+15	7.85E+00
4-Methylphenol	1	NC	1.72E-01	1.72E-01	1.72E-01	NC	1.72E-01
4-Nitroaniline	1	NC	1.83E+03	1.83E+03	1.83E+03	NC	1.83E+03
Acenapthylene	3	Lognormal	1.30E-01	1.26E+02	3.78E+02	4.03E+84	3.78E+02
Acetone	11	Lognormal	1.50E-02	4.85E+00	2.11E+01	1.58E+03	2.11E+01
Aluminum	11	Lognormal	4.50E+02	3.85E+03	1.21E+04	1.08E+04	1.08E+04
Anthracene	4	Lognormal	1.29E-01	1.70E+02	6.80E+02	1.80E+34	6.80E+02
Arsenic	2	NC	3.00E+00	1.45E+01	2.60E+01	NC	2.60E+01
Barium	11	Lognormal	3.80E+01	6.05E+02	3.24E+03	5.87E+03	3.24E+03
Benzene	7	Lognormal	4.00E-03	1.52E+01	6.13E+01	1.27E+12	6.13E+01
Benzo(a)anthracene	3	Lognormal	5.54E-01	1.26E+02	3.78E+02	9.26E+60	3.78E+02
Benzo(a)pyrene	2	NC	7.80E-01	1.36E+02	2.72E+02	NC	2.72E+02
Benzo(b)fluoranthene	3	Lognormal	4.42E-01	7.10E+01	2.11E+02	1.37E+50	2.11E+02
Benzo(g,h,i)perylene	2	NC	4.94E-01	5.69E+01	1.13E+02	NC	1.13E+02
Benzoic acid	2	Lognormal	1.41E+00	2.02E+00	2.64E+00	NC	2.64E+00
Benzyl alcohol	1	NC	7.92E+00	7.92E+00	7.92E+00	NC	7.92E+00
Cadmium	4	Normal	5.00E+00	1.88E+02	2.94E+02	3.36E+02	2.94E+02
Chlorobenzene	6	Lognormal	2.40E-02	9.76E+01	4.52E+02	2.94E+17	4.52E+02
Chloroform	2	Normal	5.30E-02	1.23E-01	1.92E-01	5.61E-01	1.92E-01
Chromium	8	Lognormal	4.00E+00	4.21E+01	1.00E+02	6.37E+02	1.00E+02
Chrysene	3	Lognormal	7.50E-01	1.12E+02	3.32E+02	5.95E+47	3.32E+02
Cobalt	5	Lognormal	3.00E+00	3.64E+01	1.05E+02	7.44E+03	1.05E+02
Copper	8	Lognormal	3.00E+00	5.36E+02	2.44E+03	1.74E+06	2.44E+03
Cyanide	2	NC	2.00E+00	2.00E+00	2.00E+00	NC	2.00E+00
Di-N-butyl phthalate	8	Lognormal	3.43E-01	4.03E+00	2.57E+01	2.84E+01	2.57E+01
Dibenofuran	4	Lognormal	1.43E-01	1.55E+01	6.04E+01	2.26E+15	6.04E+01
Dibenzo(a,h)anthracene	1	NC	3.17E+01	3.17E+01	3.17E+01	NC	3.17E+01
Ethylbenzene	3	Normal	4.38E+00	9.06E+00	1.28E+01	1.63E+01	1.28E+01
Fluoranthene	4	Lognormal	1.45E-01	3.33E+02	1.33E+03	8.60E+34	1.33E+03
Fluorene	3	Lognormal	2.47E-01	1.61E+02	4.83E+02	7.75E+78	4.83E+02
Hexachlorobenzene	1	NC	7.14E-01	7.14E-01	7.14E-01	NC	7.14E-01
Ideno(1,2,3-cd)pyrene	1	NC	1.36E+02	1.36E+02	1.36E+02	NC	1.36E+02
Iron	11	Lognormal	5.10E+02	2.32E+04	8.45E+04	4.98E+05	8.45E+04
Lead	2	NC	4.00E+00	5.77E+02	1.15E+03	NC	1.15E+03
Manganese	11	Lognormal	7.00E+00	3.86E+03	3.65E+04	2.74E+06	3.65E+04
Mercury	3	Lognormal	8.00E-01	2.03E+00	3.90E+00	1.78E+03	3.90E+00
Methylene chloride	11	Lognormal	6.00E-03	6.34E+00	5.56E+01	8.47E+03	5.56E+01
N-Nitrosodiphenylamine	1	NC	1.00E-07	1.00E-07	1.00E-07	NC	1.00E-07
Napthalene	4	Lognormal	4.40E-02	5.67E+02	2.27E+03	1.59E+44	2.27E+03
Nickel	10	Lognormal	4.00E+00	1.77E+03	1.51E+04	3.57E+06	1.51E+04
Phenanthrene	6	Lognormal	4.70E-02	3.53E+02	2.11E+03	3.01E+14	2.11E+03
Phenol	1	NC	4.22E-01	4.22E-01	4.22E-01	NC	4.22E-01
Pyrene	3	Lognormal	9.35E-01	2.22E+02	6.64E+02	5.05E+63	6.64E+02
Selenium	1	NC	2.00E+00	2.00E+00	2.00E+00	NC	2.00E+00
Silver	2	Lognormal	9.00E+00	2.65E+01	4.40E+01	NC	4.40E+01
Total PCBs	7	Lognormal	2.51E-01	2.73E+03	1.80E+04	5.45E+15	1.80E+04
Tetrachloroethene	1	NC	5.65E+00	5.65E+00	5.65E+00	NC	5.65E+00
Thallium	1	NC	1.00E+00	1.00E+00	1.00E+00	NC	1.00E+00
Tin	3	Lognormal	1.40E+01	5.50E+01	1.11E+02	1.05E+07	1.11E+02
Toluene	5	Lognormal	1.45E-01	2.28E+01	7.65E+01	2.05E+10	7.65E+01
Total Xylenes	3	Normal	1.51E+00	1.48E+01	2.36E+01	3.46E+01	2.36E+01
Trichloroethene	1	NC	1.00E-02	1.00E-02	1.00E-02	NC	1.00E-02
Vanadium	6	Lognormal	7.00E+00	3.23E+01	9.50E+01	1.97E+02	9.50E+01
Zinc	11	Lognormal	8.00E+00	4.74E+03	3.95E+04	1.61E+07	3.95E+04
bis(2-ethylhexyl)phthalate	4	Lognormal	2.51E-01	4.28E-01	6.14E-01	1.10E+00	6.14E-01

(a) - Only concentrations reported as detected by the laboratory were used in the calculation of statistics for subsurface soil.

Appendix C-4.10
Summary Statistics for Site I Subsurface Soil
Sauget Area I

		Shapiro-Wilk's Test for Normality	Summary Statistics (mg/kg)			95% UCL (mg/kg)	
Constituent	**Number of Samples for Statistics (n)**	**Dataset Distribution**	**Minimum**	**Mean**	**Maximum**	**UCL**	**Site Concentration (mg/kg)**
1,1,1-Trichloroethane	2	Lognormal	4.32E-01	1.06E+00	1.69E+00	NC	1.69E+00
1,2,4-Trichlorobenzene	9	Lognormal	6.71E+00	1.40E+03	8.26E+03	1.17E+06	8.26E+03
1,2-Dichlorobenzene	5	Lognormal	2.68E+00	8.29E+01	3.24E+02	7.93E+04	3.24E+02
1,3-Dichlorobenzene	2	NC	1.89E+01	4.45E+01	7.01E+01	NC	7.01E+01
1,4-Dichlorobenzene	8	Lognormal	1.60E+00	2.55E+02	1.84E+03	1.26E+05	1.84E+03
2,4-Dichlorophenol	1	NC	9.00E+00	9.00E+00	9.00E+00	NC	9.00E+00
2-Butanone (MEK)	15	Normal	1.20E-02	6.86E+00	1.69E+01	9.61E+00	9.61E+00
2-Methylnapthalene	7	Lognormal	1.70E+00	3.85E+01	1.69E+02	2.64E+03	1.69E+02
4,4'-DDT	1	NC	4.31E+00	4.31E+00	4.31E+00	NC	4.31E+00
4,4'-DDD	2	NC	6.64E+00	1.82E+01	2.97E+01	NC	2.97E+01
4-Chloroaniline	1	NC	4.32E+01	4.32E+01	4.32E+01	NC	4.32E+01
4-Methyl-2-pentanone	2	NC	1.00E-03	2.08E+00	4.16E+00	NC	4.16E+00
Acenapthene	1	NC	1.40E+01	1.40E+01	1.40E+01	NC	1.40E+01
Acetone	15	Lognormal	5.49E-01	6.66E+00	1.69E+01	2.17E+01	1.69E+01
Aluminum	16	Lognormal	1.01E+03	4.17E+03	1.35E+04	7.92E+03	7.92E+03
Anthracene	2	NC	2.31E+01	1.13E+02	2.03E+02	NC	2.03E+02
Antimony	3	Lognormal	1.40E+01	2.23E+03	6.66E+03	5.78E+53	6.66E+03
Arsenic	9	Lognormal	1.00E+00	6.56E+00	1.40E+01	2.05E+01	1.40E+01
Barium	12	Lognormal	8.00E+00	9.83E+02	3.60E+03	4.82E+04	3.60E+03
Benzene	10	Lognormal	2.30E-02	3.81E+00	2.41E+01	2.34E+02	2.41E+01
Benzo(a)anthracene	2	Lognormal	2.47E+00	4.59E+00	6.72E+00	NC	6.72E+00
Benzo(a)pyrene	1	NC	2.47E+00	2.47E+00	2.47E+00	NC	2.47E+00
Benzo(b)fluoranthene	2	NC	1.51E+00	1.70E+01	3.24E+01	NC	3.24E+01
Benzoic acid	1	NC	6.21E+01	6.21E+01	6.21E+01	NC	6.21E+01
Beryllium	1	NC	1.53E+03	1.53E+03	1.53E+03	NC	1.53E+03
Butyl benzyl phthalate	1	NC	1.39E+02	1.39E+02	1.39E+02	NC	1.39E+02
Pentachlorophenol(PCP)	1	NC	1.92E+02	1.92E+02	1.92E+02	NC	1.92E+02
Cadmium	7	Lognormal	2.00E+00	5.57E+00	1.30E+01	1.84E+01	1.30E+01
Chlorobenzene	12	Lognormal	1.00E-02	3.47E+01	1.27E+02	7.16E+04	1.27E+02
Chromium	14	Lognormal	4.00E+00	7.61E+01	7.31E+02	3.60E+02	3.60E+02
Chrysene	2	Normal	3.97E+00	4.78E+00	5.59E+00	9.88E+00	5.59E+00
Cobalt	7	Lognormal	1.30E+01	3.89E+01	1.40E+02	1.05E+02	1.40E+02
Copper	8	Lognormal	2.30E+01	2.98E+02	6.30E+02	2.10E+03	6.30E+02
Cyanide	3	Lognormal	2.00E+00	1.06E+03	3.18E+03	1.14E+80	3.18E+03
Di-N-butyl phthalate	9	Lognormal	1.34E-01	3.71E+01	2.03E+02	3.15E+04	2.03E+02
Dibenofuran	1	NC	5.59E+00	5.59E+00	5.59E+00	NC	5.59E+00
Diethylphthalate	1	NC	1.69E+01	1.69E+01	1.69E+01	NC	1.69E+01
Ethylbenzene	10	Lognormal	9.60E-02	4.65E+00	1.51E+01	1.14E+02	1.51E+01
Fluoranthene	3	Lognormal	8.91E+00	7.69E+01	2.03E+02	3.81E+13	2.03E+02
Fluorene	3	Lognormal	3.08E+00	1.49E+01	3.54E+01	7.33E+08	3.54E+01
Hexachlorobenzene	7	Lognormal	3.23E+01	2.58E+02	1.27E+03	2.10E+03	1.27E+03
Hexachloroethane	1	NC	3.01E+00	3.01E+00	3.01E+00	NC	3.01E+00
Iron	16	Lognormal	5.43E+02	1.17E+04	4.15E+04	3.11E+04	3.11E+04
Lead	15	Lognormal	3.00E+00	2.06E+03	2.33E+04	3.08E+05	2.33E+04
Manganese	1	NC	9.80E+01	9.80E+01	9.80E+01	NC	9.80E+01
Mercury	5	Normal	5.00E-01	1.70E+00	3.20E+00	2.69E+00	3.20E+00
Methylene chloride	16	Lognormal	7.00E-03	1.52E+00	6.77E+00	1.64E+02	6.77E+00
N-Nitrosodiphenylamine	2	NC	4.59E+01	7.31E+01	1.00E+02	NC	1.00E+02
Napthalene	7	Lognormal	1.10E+00	9.81E+01	5.15E+02	5.75E+05	5.15E+02
Nickel	12	Lognormal	9.00E-01	3.35E+02	2.41E+03	2.50E+04	2.41E+03
Phenanthrene	5	Lognormal	1.32E+00	3.43E+01	1.02E+02	6.24E+04	1.02E+02
Phenol	2	NC	1.52E+01	2.11E+01	2.70E+01	NC	2.70E+01
Pyrene	4	Lognormal	2.21E+00	1.96E+01	4.93E+01	8.42E+05	4.93E+01
Selenium	1	NC	1.32E+03	1.32E+03	1.32E+03	NC	1.32E+03
Total PCBs	5	Normal	2.04E+01	1.81E+02	3.43E+02	3.06E+02	3.43E+02
Tetrachloroethene	5	Lognormal	6.12E-01	2.57E+00	5.27E+00	1.81E+01	5.27E+00
Tin	9	Lognormal	2.00E+00	1.92E+01	5.50E+01	1.15E+02	5.50E+01
Toluene	11	Lognormal	4.80E-02	1.13E+01	7.79E+01	4.10E+02	7.79E+01
Total Xylenes	10	Lognormal	8.00E-02	4.96E+00	1.92E+01	2.70E+02	1.92E+01
Toxaphene	1	NC	4.93E+02	4.93E+02	4.93E+02	NC	4.93E+02
Trichloroethene	2	Normal	6.48E-01	2.23E+00	3.81E+00	1.22E+01	3.81E+00
Vanadium	7	Lognormal	1.80E+01	1.07E+02	5.53E+02	8.22E+02	5.53E+02
Zinc	16	Lognormal	1.30E+01	6.24E+02	6.33E+03	5.00E+03	5.00E+03
bis(2-ethylhexyl)phthalate	7	Lognormal	2.38E+00	3.49E+01	1.31E+02	7.45E+02	1.31E+02
trans-1,2-Dichloroethene	1	NC	3.00E-03	3.00E-03	3.00E-03	NC	3.00E-03

(a) - Only concentrations reported as detected by the laboratory were used in the calculation of statistics for subsurface soil.

Appendix C-4.11
Summary Statistics for Site L Subsurface Soil
Sauget Area I

Constituent	Number of Samples for Statistics (a)	Shapiro-Wilke's Test for Normality: Dataset Distribution	Summary Statistics (mg/kg): Minimum	Summary Statistics (mg/kg): Mean	Summary Statistics (mg/kg): Maximum	95% UCL (mg/kg): UCL	Site Concentration (mg/kg)
1,2,4-Trichlorobenzene	3	Normal	5.50E+00	5.25E+01	7.90E+01	1.21E+02	7.90E+01
1,2-Dichlorobenzene	4	Normal	1.00E-02	3.50E+00	7.70E+00	7.23E+00	7.70E+00
1,3-Dichlorobenzene	1	NC	4.30E+00	4.30E+00	4.30E+00	NC	4.30E+00
1,4-Dichlorobenzene	9	Lognormal	1.80E-02	2.34E+01	1.00E+02	1.29E+07	1.00E+02
2,4,6-Trichlorophenol	1	NC	1.50E+00	1.50E+00	1.50E+00	NC	1.50E+00
2,4-Dichlorophenol	2	NC	2.40E+00	6.70E+00	1.10E+01	NC	1.10E+01
2-Butanone (MEK)	3	Lognormal	1.60E-02	3.34E+00	1.00E+01	6.98E+61	1.00E+01
2-Chlorophenol	3	Normal	1.30E-02	1.59E+00	2.60E+00	3.92E+00	2.60E+00
2-Methylnapthalene	6	Normal	2.10E-01	1.42E+00	3.10E+00	2.36E+00	3.10E+00
4-Chloroaniline	6	Lognormal	4.30E-02	9.87E+01	2.70E+02	2.89E+14	2.70E+02
4-Methyl-2-pentanone	4	Lognormal	8.00E-03	7.30E-02	1.67E-01	1.49E+02	1.67E-01
4-Methylphenol	5	Normal	8.80E-02	3.40E+00	7.10E+00	6.19E+00	7.10E+00
Acenapthene	3	Lognormal	4.40E-02	1.08E+00	3.10E+00	3.47E+23	3.10E+00
Acenapthylene	1	NC	2.80E-01	2.80E-01	2.80E-01	NC	2.80E-01
Acetone	6	Lognormal	1.50E-02	1.01E+00	4.56E+00	2.30E+04	4.56E+00
Aluminum	11	Normal	1.12E+03	5.80E+03	1.28E+04	7.82E+03	7.82E+03
Anthracene	3	Lognormal	2.80E-02	1.46E+00	4.20E+00	3.58E+31	4.20E+00
Antimony	1	NC	3.20E+01	3.20E+01	3.20E+01	NC	3.20E+01
Arsenic	10	Lognormal	4.90E+00	5.36E+01	1.72E+02	4.08E+02	1.72E+02
Barium	15	Lognormal	1.30E+00	3.00E+02	1.44E+03	5.47E+04	1.44E+03
Benzene	5	Lognormal	4.00E-03	2.01E+00	5.70E+00	6.67E+13	5.70E+00
Benzo(a)anthracene	4	Lognormal	7.50E-02	2.46E+00	8.60E+00	9.54E+08	8.60E+00
Benzo(a)pyrene	3	Lognormal	2.20E-02	1.80E+00	5.30E+00	8.81E+35	5.30E+00
Benzo(b)fluoranthene	3	Lognormal	5.80E-02	1.88E+00	5.40E+00	2.48E+24	5.40E+00
Benzo(g,h,I)perylene	1	NC	2.70E-02	2.70E-02	2.70E-02	NC	2.70E-02
Benzo(k)fluoranthene	1	NC	4.60E+00	4.60E+00	4.60E+00	NC	4.60E+00
Benzoic acid	2	NC	4.90E-02	1.62E+00	3.20E+00	NC	3.20E+00
Butyl benzyl phthalate	1	NC	5.40E+00	5.40E+00	5.40E+00	NC	5.40E+00
Corrosivity	2	Lognormal	8.20E+00	8.30E+00	8.40E+00	NC	8.40E+00
Pentachlorophenol(PCP)	*4*	*Lognormal*	*1.15E+01*	*3.17E+01*	*5.82E+01*	*2.13E+02*	*5.82E+01*
Reactivity-Sulfide	2	Normal	2.40E+01	4.75E+01	7.10E+01	1.96E+02	7.10E+01
Cadmium	6	Lognormal	1.90E-02	8.03E+00	4.20E+01	1.32E+10	4.20E+01
Calcium	6	Lognormal	1.55E+04	2.81E+04	7.55E+04	6.01E+04	7.55E+04
Chlorobenzene	8	Lognormal	1.20E-02	1.25E+00	5.30E+00	2.41E+03	5.30E+00
Chloroform	3	Lognormal	4.90E-02	6.80E+00	2.03E+01	2.66E+48	2.03E+01
Chromium	10	Lognormal	3.00E+00	1.16E+01	2.70E+01	2.36E+01	2.36E+01
Chrysene	4	Lognormal	7.60E-02	2.20E+00	8.20E+00	7.34E+08	8.20E+00
Cobalt	7	Normal	5.90E+00	7.70E+00	9.00E+00	8.67E+00	9.00E+00
Copper	10	Lognormal	9.70E+00	9.27E+01	3.08E+02	4.33E+02	3.08E+02
Cresol(m,p)	4	Lognormal	1.00E-01	1.43E-01	1.90E-01	2.58E-01	1.90E-01
Cyanide	1	NC	4.60E-01	4.60E-01	4.60E-01	NC	4.60E-01
Di-N-butyl phthalate	4	Lognormal	1.71E-01	1.28E+00	2.78E+00	3.15E+03	2.78E+00
Dibenofuran	2	NC	4.20E-02	1.52E+00	3.00E+00	NC	3.00E+00
Diethylphthalate	2	Lognormal	3.10E-01	6.55E-01	1.00E+00	NC	1.00E+00
Ethylbenzene	1	NC	4.00E-02	4.00E-02	4.00E-02	NC	4.00E-02
Fluoranthene	4	Lognormal	1.30E-01	4.27E+00	1.60E+01	2.05E+09	1.60E+01
Fluorene	2	NC	7.90E-02	2.54E+00	5.00E+00	NC	5.00E+00
Hexachlorobenzene	1	NC	4.80E+00	4.80E+00	4.80E+00	NC	4.80E+00
Hexachloroethane	1	NC	4.90E-02	4.90E-02	4.90E-02	NC	4.90E-02
Ideno(1,2,3-cd)pyrene	2	NC	1.10E-01	1.51E+00	2.90E+00	NC	2.90E+00
Iron	11	Normal	1.40E+03	9.96E+03	2.40E+04	1.45E+04	1.45E+04
Lead	13	Lognormal	2.20E-01	7.46E+01	6.64E+02	5.83E+03	6.64E+02
Magnesium	6	Normal	3.84E+02	4.91E+03	9.44E+03	7.92E+03	9.44E+03
Manganese	11	Lognormal	1.00E+01	2.19E+02	7.82E+02	3.68E+03	7.82E+02
Mercury	7	Lognormal	1.00E-02	3.09E-01	1.80E+00	6.02E+01	1.80E+00
Methylene chloride	5	Lognormal	5.00E-03	4.89E-01	2.28E+00	5.92E+07	2.28E+00
Napthalene	4	Lognormal	9.60E-02	2.02E+00	7.30E+00	7.72E+06	7.30E+00
Nickel	10	Lognormal	2.10E+01	3.78E+02	2.39E+03	2.67E+03	2.39E+03
Phenanthrene	5	Lognormal	9.10E-02	5.18E+00	2.30E+01	1.33E+06	2.30E+01
Phenol	5	Normal	3.46E-01	8.77E+00	1.60E+01	1.57E+01	1.60E+01
Potassium	6	Lognormal	9.75E+02	1.31E+03	2.28E+03	1.86E+03	2.28E+03
Pyrene	4	Lognormal	1.30E-01	5.96E+00	2.30E+01	3.48E+10	2.30E+01
Total PCBs	2	NC	1.60E+01	2.58E+02	5.00E+02	NC	5.00E+02
Toluene	7	Lognormal	5.00E-02	6.65E+01	4.00E+02	3.21E+09	4.00E+02
Total Xylenes	4	Lognormal	1.79E-01	3.10E+00	1.10E+01	2.48E+06	1.10E+01
Vanadium	9	Lognormal	7.70E+00	3.23E+01	1.31E+02	7.51E+01	7.51E+01
Zinc	*11*	*Lognormal*	*6.40E+00*	*5.34E+02*	*4.24E+03*	*1.61E+04*	*4.24E+03*
bis(2-ethylhexyl)phthalate	6	Normal	1.70E-02	9.21E-01	2.20E+00	1.61E+00	2.20E+00

(a) - Only concentrations reported as detected by the laboratory were used in the calculation of statistics for subsurface soil.

Appendix C 4.12

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Floodplain Soils
Sauget Area I

Compounds	Maximum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
Herbicides (ug/kg)			
2,4,5-T	9.9		
2,4,5-TP (Silvex)	9.9		
2,4-D	9.9		
2,4-DB	9.9		
Dalapon	85		
Dicamba	47		
Dichloroprop	230		
Dinoseb	230		
MCPA	2500		
MCPP	4700		
Metals (mg/kg)			
Antimony	2.5	5	
Beryllium	0.75	10	
Cyanide, Total	0.66		
Molybdenum	0.68	2	
Selenium	**0.97 to 1.3**	0.21	Detection limit exceeds benchmark in 56/56 samples for floodplain soil
Silver	1.2	2	
Sodium	260		
Thallium	**0.97 to 1.3**	1	Detection limit exceeds benchmark in 42/55 samples for floodplain soil
PCBs (ug/kg)			
Decachlorobiphenyl	91	371[a]	
Dichlorobiphenyl	35	371[a]	
Heptachlorobiphenyl	100	371[a]	
Hexachlorobiphenyl	70	371[a]	
Monochlorobiphenyl	35	371[a]	
Nonachlorobiphenyl	180	371[a]	
Octachlorobiphenyl	100	371[a]	
Pentachlorobiphenyl	70	371[a]	
Tetrachlorobiphenyl	70	371[a]	
Trichlorobiphenyl	35	371[a]	
Pesticides (ug/kg)			

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Floodplain Soils
Sauget Area I

Compounds	Maxiumum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
4,4'-DDD	7.8		
4,4'-DDE	7.2		
4,4'-DDT	7.4		
Aldrin	18		
Alpha Chlordane	18		
alpha-BHC	5.4		
beta-BHC	5.4		
delta-BHC	5.4		
Dieldrin	36		
Endosulfan I	18		
Endosulfan II	36		
Endosulfan sulfate	36		
Endrin	36		
Endrin aldehyde	36		
Endrin ketone	36		
Gamma Chlordane	18		
gamma-BHC (Lindane)	18		
Heptachlor	18		
Heptachlor epoxide	18		
Methoxychlor	180		
Toxaphene	1800		
SVOCs (ug/kg)			
1,2,4-Trichlorobenzene	220	20000	
1,2-Dichlorobenzene	220		
1,3-Dichlorobenzene	220		
1,4-Dichlorobenzene	220	20000	
2,2'-Oxybis(1-Chloropropane)	210		
2,4,5-Trichlorophenol	220	9000	
2,4,6-Trichlorophenol	220	4000	
2,4-Dichlorophenol	220		
2,4-Dinitrophenol	990	20000	
2,4-Dinitrotoluene	220		
2,6-Dinitrotoluene	220		
2-Chloronaphthalene	220		
2-Chlorophenol	220		
2-Methylnaphthalene	220		

Appendix C 4.12

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Floodplain Soils
Sauget Area I

Compounds	Maximum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
2-Methylphenol (o-cresol)	220		
2-Nitroaniline	990		
2-Nitrophenol	220		
3,3'-Dichlorobenzidine	430		
3-Methylphenol/4-Methylphenol	410		
3-Nitroaniline	990		
4,6-Dinitro-2-methylphenol	1100		
4-Bromophenylphenyl ether	220		
4-Chloro-3-methylphenol	220		
4-Chloroaniline	430		
4-Chlorophenylphenyl ether	220		
4-Nitroaniline	1100		
4-Nitrophenol	1100	7000	
Acenaphthene	220	20000	
Acenaphthylene	220		
Anthracene	220		
Benzo(a)anthracene	220		
Benzo(a)pyrene	180		
Benzo(b)fluoranthene	210		
Benzo(g,h,i)perylene	220		
Benzo(k)fluoranthene	220		
bis(2-Chloroethoxy)methane	220		
bis(2-Chloroethyl)ether	220		
bis(2-Ethylhexyl)phthalate	220		
Butylbenzylphthalate	220		
Carbazole	220		
Chrysene	210		
Di-n-butylphthalate	210	200000	
Di-n-octylphthalate	210		
Dibenzo(a,h)anthracene	99		
Dibenzofuran	220		
Diethylphthalate	220	100000	
Dimethylphthalate	220		
Fluoranthene	220		
Fluorene	220		
Hexachlorobenzene	92		

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Floodplain Soils
Sauget Area I

Compounds	Maxiumum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
Hexachlorobutadiene	220		
Hexachlorocyclopentadiene	220	10000	
Hexachloroethane	220		
Indeno(1,2,3-cd)pyrene	220		
Isophorone	220		
N-Nitroso-di-n-propylamine	220		
N-Nitrosodiphenylamine	210		
N-Nitrosodiphenylamine/Diphenylamine	220		
Naphthalene	220		
Nitrobenzene	220		
Pentachlorophenol	1100	3000	
Phenanthrene	220		
Phenol	220	30000	
Pyrene	220		
trans-1,3-Dichloropropene	6.7		
VOCs (ug/kg)			
1,1,1-Trichloroethane	8.3		
1,1,2,2-Tetrachloroethane	8.3		
1,1,2-Trichloroethane	8.3		
1,1-Dichloroethane	8.3		
1,1-Dichloroethene	7.7		
1,2-Dichloroethane	8.3		
1,2-Dichloropropane	8.3		
2-Butanone (MEK)	56		
2-Hexanone	42		
4-Methyl-2-pentanone (MIBK)	42		
Acetone	83		
Benzene	8.3		
Bromodichloromethane	8.3		
Bromoform	8.3		
Bromomethane (Methyl bromide)	17		
Carbon disulfide	8.3		
Carbon tetrachloride	8.3		
Chlorobenzene	8.3	40000	
Chloroethane	17		
Chloroform	8.3		

Appendix C 4.12

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Floodplain Soils
Sauget Area I

Compounds	Maxiumum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
Chloromethane	17		
Cis/Trans-1,2-Dichloroethene	8.3		
cis-1,3-Dichloropropene	6.7		
Dibromochloromethane	8.3		
Ethylbenzene	8.3		
Methylene chloride (Dichloromethane)	8.3		
Styrene	8.3	300000	
Tetrachloroethene	8.3		
Toluene	8.3	200000	
Trichloroethene	8.3		
Vinyl chloride	17		
Xylenes, Total	8.3		
Dioxins (ug/kg)			
2,3,7,8-TCDD TEQ (mammals)		3.15E-06	

[1] Effroymson et al., 1997. Preliminary Goals for Ecological Endpoints.

[a] Benchmark for PCBs.

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Sites G, H, I, L, and N
Sauget Area I

Compounds	Maximum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
Herbicides (ug/kg)			
2,4,5-T	180		
2,4,5-TP (Silvex)	180		
2,4-D	180		
2,4-DB	180		
Dalapon	1400		
Dicamba	440		
Dichloroprop	2200		
Dinoseb	2200		
MCPA	44000		
MCPP	44000		
Metals (mg/kg)			
Antimony	2.4	5	
Beryllium	0.59	10	
Cyanide, Total	0.6		
Selenium	**0.99 to 1.2**	0.21	Detection limit exceeds benchmark in: 4/4 samples for Site G; 1/4 samples for Site H; 1/4 samples for Site I; 3/4 samples for Site N. Detected in all samples for L.
Silver	1.2	2	
Sodium	220		
Thallium	**0.62 to 1.2**	1	Detection limit exceeds benchmark in: 4/4 samples for Site G; 1/4 samples for Site H; 1/4 samples for Site I; 2/4 samples for Site N. Detected in all samples for L.
PCBs (ug/kg)			
Decachlorobiphenyl	**17 to 930**	371[a]	Maximum detection limit exceeds Total PCB benchmark.
Dichlorobiphenyl	170	371[a]	
Heptachlorobiphenyl	**10 to 530**	371[a]	Maximum detection limit exceeds Total PCB benchmark.
Hexachlorobiphenyl	350	371[a]	
Monochlorobiphenyl	170	371[a]	
Nonachlorobiphenyl	**17 to 880**	371[a]	Maximum detection limit exceeds Total PCB benchmark.
Octachlorobiphenyl	**10 to 530**	371[a]	Maximum detection limit exceeds Total PCB benchmark.
Pentachlorobiphenyl	350	371[a]	
Tetrachlorobiphenyl	350	371[a]	
Trichlorobiphenyl	170	371[a]	
Pesticides (ug/kg)			
4,4'-DDD	18		
4,4'-DDE	7.1		
4,4'-DDT	18		
Aldrin	9.1		
Alpha Chlordane	380		

Appendix C-4.13

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Sites G, H, I, L, and N
Sauget Area I

Compounds	Maximum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
alpha-BHC	110		
beta-BHC	110		
delta-BHC	110		
Dieldrin	18		
Endosulfan I	9.4		
Endosulfan II	18		
Endosulfan sulfate	730		
Endrin	18		
Endrin aldehyde	18		
Endrin ketone	7.1		
Gamma Chlordane	3.7		
gamma-BHC (Lindane)	380		
Heptachlor	9.4		
Heptachlor epoxide	3.7		
Methoxychlor	94		
Toxaphene	38000		
SVOCs (ug/kg)			
1,2,4-Trichlorobenzene	360	20000	
1,2-Dichlorobenzene	360		
1,3-Dichlorobenzene	360		
1,4-Dichlorobenzene	360	20000	
2,2'-Oxybis(1-Chloropropane)	360		
2,4,5-Trichlorophenol	360	9000	
2,4,6-Trichlorophenol	360	4000	
2,4-Dichlorophenol	360		
2,4-Dinitrophenol	1800	20000	
2,4-Dinitrotoluene	360		
2,6-Dinitrotoluene	360		
2-Chloronaphthalene	360		
2-Chlorophenol	360		
2-Methylnaphthalene	200		
2-Methylphenol (o-cresol)	360		
2-Nitroaniline	1800		
2-Nitrophenol	360		
3,3'-Dichlorobenzidine	710		
3-Methylphenol/4-Methylphenol	360		
3-Nitroaniline	1800		
4,6-Dinitro-2-methylphenol	1800		
4-Bromophenylphenyl ether	360		
4-Chloro-3-methylphenol	360		
4-Chloroaniline	710		

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Sites G, H, I, L, and N
Sauget Area I

Compounds	Maximum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
4-Chlorophenylphenyl ether	360		
4-Nitroaniline	1800		
4-Nitrophenol	1800	7000	
Acenaphthene	200	20000	
Acenaphthylene	360		
Anthracene	200		
Benzo(a)anthracene	200		
Benzo(a)pyrene	110		
Benzo(b)fluoranthene	200		
Benzo(g,h,i)perylene	200		
Benzo(k)fluoranthene	200		
bis(2-Chloroethoxy)methane	360		
bis(2-Chloroethyl)ether	360		
bis(2-Ethylhexyl)phthalate	360		
Butylbenzylphthalate	360		
Carbazole	200		
Chrysene	200		
Di-n-butylphthalate	360	200000	
Di-n-octylphthalate	360		
Dibenzo(a,h)anthracene	110		
Dibenzofuran	200		
Diethylphthalate	360	100000	
Dimethylphthalate	360		
Fluoranthene	200		
Fluorene	200		
Hexachlorobenzene	150		
Hexachlorobutadiene	360		
Hexachlorocyclopentadiene	360	10000	
Hexachloroethane	360		
Indeno(1,2,3-cd)pyrene	200		
Isophorone	360		
N-Nitroso-di-n-propylamine	360		
N-Nitrosodiphenylamine	360		
Naphthalene	200		
Nitrobenzene	360		
Pentachlorophenol	1800	3000	
Phenanthrene	200		
Phenol	360	30000	
Pyrene	200		
VOCs (ug/kg)			
1,1,1-Trichloroethane	9.7		

Appendix C-4.13

Comparison of Surface Soil Detection Limits to Ecological Benchmarks
Sites G, H, I, L, and N
Sauget Area I

Compounds	Maximum Detection Limit or Range	Soil Benchmark[1]	Comments on detection limits
1,1,2,2-Tetrachloroethane	9.7		
1,1,2-Trichloroethane	9.7		
1,1-Dichloroethane	9.7		
1,1-Dichloroethene	8.9		
1,2-Dichloroethane	9.7		
1,2-Dichloropropane	9.7		
2-Butanone (MEK)	48		
2-Hexanone	48		
4-Methyl-2-pentanone (MIBK)	48		
Acetone	97		
Benzene	9.7		
Bromodichloromethane	9.7		
Bromoform	9.7		
Bromomethane (Methyl bromide)	19		
Carbon disulfide	9.7		
Carbon tetrachloride	9.7		
Chlorobenzene	9.7	40000	
Chloroethane	19		
Chloroform	9.7		
Chloromethane	19		
cis-1,3-Dichloropropene	7.8		
Cis/Trans-1,2-Dichloroethene	9.7		
Dibromochloromethane	9.7		
Ethylbenzene	9.7		
Methylene chloride (Dichloromethane)	9.7		
Styrene	9.7	300000	
Tetrachloroethene	9.7		
Toluene	9.7	200000	
trans-1,3-Dichloropropene	7.8		
Trichloroethene	9.7		
Vinyl chloride	19		
Xylenes, Total	9.7		
Dioxins (ug/kg)			
2,3,7,8-TCDD TEQ (mammals)		3.15E-06	

[1]Efroymson et al., 1997. Preliminary Remediation Goals for Ecological Endpoints.
[a]Benchmark for PCBs.
Bold indicates detection limit exceeds benchmark.

APPENDIX D

BENTHIC COMMUNITY ANALYSIS RESULTS

Appendix D
Benthic Macroinvertebrate Data for Dead Creek Sector F, the Borrow Pit Lake, and Reference Areas
Sauget Area I

Station ID	Phylum	Class	Order	Family	Sub-Family	Tribe	Genus	Species	Number of Organisms Counted	Amount of Sample Analyzed (%)	Sample Total	Relative Abundance (Percent)
F-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	5	50	10	19.23
F-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Einfeldia*	*sp.*	4	50	8	15.38
F-1-1	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	3	50	6	11.54
F-1-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Culicoides*	*sp.*	3	50	6	11.54
F-1-1	Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			*Sphaerium*	*sp.*	2	50	4	7.69
F-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*claparedianus*	1	50	2	3.85
F-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Haemonais*	*waldvogeli*	1	50	2	3.85
F-1-1	Arthropoda	Insecta	Lepidoptera	Pyralidae			*Acentria*	*sp.*	1	50	2	3.85
F-1-1	Arthropoda	Insecta	Hemiptera	Pleidae			*Neoplea*	*sp.*	1	50	2	3.85
F-1-1	Arthropoda	Insecta	Coleoptera	Hydrophilidae			*Hydrochus*	*sp.*	1	50	2	3.85
F-1-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	50	2	3.85
F-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*decorus*	1	50	2	3.85
F-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*sp.*	1	50	2	3.85
F-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*carinatus*	1	50	2	3.85
F-1-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*sp.*	17	50	34	56.67
F-1-2	Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			*Sphaerium*	*sp.*	8	50	16	26.67
F-1-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	3	50	6	10.00
F-1-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*claparedianus*	1	50	2	3.33
F-1-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	50	2	3.33
F-1-3	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	5	50	10	22.73
F-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Culicoides*	*sp.*	4	50	8	18.18
F-1-3	Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			*Musculium*	*sp.*	4	50	8	18.18
F-1-3	Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			*Sphaerium*	*sp.*	3	50	6	13.64
F-1-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*sp.*	2	50	4	9.09
F-1-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	2	50	4	9.09
F-1-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	50	2	4.55
F-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	50	2	4.55
F-2-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp.*	7	50	14	38.89
F-2-1	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	5	50	10	27.78
F-2-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	3	50	6	16.67
F-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Coelotanypodini	*Coelotanypus*	*scapularis*	1	50	2	5.56
F-2-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia*	*sp.*	1	50	2	5.56
F-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*sp.*	1	50	2	5.56
F-2-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	12	50	24	33.33
F-2-2	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	8	50	16	22.22
F-2-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp.*	8	50	16	22.22
F-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*sp.*	2	50	4	5.56
F-2-2	Arthropoda	Insecta	Hemiptera	Pleidae			*Neoplea*	*sp.*	2	50	4	5.56
F-2-2	Arthropoda	Insecta	Hemiptera	Mesoveliidae			*Mesovelia*	*sp.*	1	50	2	2.78
F-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	1	50	2	2.78
F-2-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Culicoides*	*sp.*	1	50	2	2.78
F-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae		*Psectrotanypus*	*sp.*	1	50	2	2.78
F-2-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	11	50	22	47.83
F-2-3	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	9	50	18	39.13
F-2-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp.*	2	50	4	8.70
F-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	1	50	2	4.35
F-3-1	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	28	50	56	53.85
F-3-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	14	50	28	26.92
F-3-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Ilyodrilus*	*templetoni*	3	50	6	5.77
F-3-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae		*Krenopelopia*	*sp.*	2	50	4	3.85
F-3-1	Arthropoda	Insecta	Coleoptera	Dytiscidae			*Hygrotus*	*sp.*	1	50	2	1.92
F-3-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Culicoides*	*sp.*	1	50	2	1.92
F-3-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	1	50	2	1.92
F-3-1	Arthropoda	Insecta	Coleoptera	Hydrophilidae			*Tropisternus*	*sp.*	1	50	2	1.92
F-3-1	Arthropoda	Insecta	Diptera	Stratiomyidae			*Stratiomys*	*sp.*	1	50	2	1.92

Appendix D
Benthic Macroinvertebrate Data for Dead Creek Sector F, the Borrow Pit Lake, and Reference Areas
Sauget Area I

Station ID	Phylum	Class	Order	Family	Sub-Family	Tribe	Genus	Species	Number of Organisms Counted	Amount of Sample Analyzed (%)	Sample Total	Relative Abundance (Percent)
F-3-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	31	50	62	45.59
F-3-2	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	27	50	54	39.71
F-3-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Ilyodrilus*	*templetoni*	2	50	4	2.94
F-3-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	2	50	4	2.94
F-3-2	Mollusca	Gastropoda	Basommatophora	Physidae			*Physella*	*heterostropha*	2	50	4	2.94
F-3-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Dero*	*vaga*	1	50	2	1.47
F-3-2	Arthropoda	Insecta	Hemiptera	Corixidae	Corixinae		*Trichocorixa*	*sp*	1	50	2	1.47
F-3-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp*	1	50	2	1.47
F-3-2	Arthropoda	Insecta	Diptera	Tipulidae			*Tipulidae (family)*		1	50	2	1.47
F-3-3	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	26	50	52	44.07
F-3-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	11	50	22	18.64
F-3-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*illinoense*	10	50	20	16.95
F-3-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp*	3	50	6	5.08
F-3-3	Arthropoda	Insecta	Diptera				*Diptera (class)*		3	50	6	5.08
F-3-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae		*Krenopelopia*	*sp*	3	50	6	5.08
F-3-3	Arthropoda	Insecta	Diptera	Tipulidae			*Limonia*	*sp*	1	50	2	1.69
F-3-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	50	2	1.69
F-3-3	Mollusca	Gastropoda	Basommatophora	Physidae			*Physella*	*heterostropha*	1	50	2	1.69
BP-1-1	Arthropoda	Insecta	Odonata	Libellulidae			*Perithemis*	*sp*	5	50	10	29.41
BP-1-1	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	3	50	6	17.65
BP-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	3	50	6	17.65
BP-1-1	Arthropoda	Insecta	Hemiptera	Corixidae			*Palmacorixa*	*sp*	2	50	4	11.76
BP-1-1	Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae			*Mooreobdella*	*microstoma*	1	50	2	5.88
BP-1-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	50	2	5.88
BP-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Natarsiini	*Natarsia*	*sp*	1	50	2	5.88
BP-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	50	2	5.88
BP-1-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	4	50	8	17.39
BP-1-2	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	3	50	6	13.04
BP-1-2	Arthropoda	Insecta	Hemiptera	Corixidae			*Palmacorixa*	*sp*	3	50	6	13.04
BP-1-2	Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae			*Mooreobdella*	*microstoma*	2	50	4	8.70
BP-1-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	2	50	4	8.70
BP-1-2	Arthropoda	Insecta	Ephemeroptera	Caenidae			*Caenis*	*sp.*	2	50	4	8.70
BP-1-2	Arthropoda	Insecta	Odonata	Libellulidae			*Perithemis*	*sp.*	2	50	4	8.70
BP-1-2	Annelida	Oligochaeta	Tubificida	Naididae			*Aulodrilus*	*pigueti*	1	50	2	4.35
BP-1-2	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	1	50	2	4.35
BP-1-2	Arthropoda	Insecta	Trichoptera	Hydroptilidae	Hydroptilinae		*Hydroptila*	*ajax*	1	50	2	4.35
BP-1-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Cryptotendipes*	*sp.*	1	50	2	4.35
BP-1-2	Arthropoda	Insecta	Odonata	*Gomphidae*			*Arigomphus*	*sp.*	1	50	2	4.35
BP-1-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	7	50	14	30.43
BP-1-3	Arthropoda	Insecta	Hemiptera	Corixidae	Corixinae		*Trichocorixa*	*sp.*	5	50	10	21.74
BP-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	2	50	4	8.70
BP-1-3	Arthropoda	Insecta	Odonata	Libellulidae			*Perithemis*	*sp.*	2	50	4	8.70
BP-1-3	Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae			*Mooreobdella*	*microstoma*	1	50	2	4.35
BP-1-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Ilyodrilus*	*templetoni*	1	50	2	4.35
BP-1-3	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	1	50	2	4.35
BP-1-3	Arthropoda	Insecta	Ephemeroptera	Caenidae			*Caenis*	*sp.*	1	50	2	4.35
BP-1-3	Arthropoda	Insecta	Coleoptera	Hydrophilidae			*Berosus*	*sp.*	1	50	2	4.35
BP-1-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	50	2	4.35
BP-1-3	Nematoda		Dorylaimida				*Alaimus*	*sp.*	1	50	2	4.35
BP-2-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	27	50	54	47.37
BP-2-1	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	6	50	12	10.53
BP-2-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Ilyodrilus*	*templetoni*	5	50	10	8.77
BP-2-1	Annelida	Oligochaeta	Tubificida	Naididae			*Aulodrilus*	*pigueti*	4	50	8	7.02
BP-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*stellatus*	3	50	6	5.26
BP-2-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	3	50	6	5.26
BP-2-1	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	2	50	4	3.51
BP-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Coelotanypodini	*Clinotanypus*	*sp.*	2	50	4	3.51
BP-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	2	50	4	3.51
BP-2-1	Arthropoda	Insecta	Odonata	Gomphidae			*Arigomphus*	*sp.*	1	50	2	1.75
BP-2-1	…ropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*salinarius*	1	50	2	1.75
BP-2-1	…ropoda	Insecta	Diptera	Ceratopogonidae			*Culicoides*	*sp.*	1	50	2	.75

Appendix D
Benthic Macroinvertebrate Data for Dead Creek Sector F, the Borrow Pit Lake, and Reference Areas
Sauget Area I

Station ID	Phylum	Class	Order	Family	Sub-Family	Tribe	Genus	Species	Number of Organisms Counted	Amount of Sample Analyzed (%)	Sample Total	Relative Abundance (Percent)
BP-2-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	13	50	26	44.83
BP-2-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Ilyodrilus*	*templetoni*	4	50	8	13.79
BP-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*salinarius*	3	50	6	10.34
BP-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Procladiini	*Procladius*	*sp.*	3	50	6	10.34
BP-2-2	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	2	50	4	6.90
BP-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Coelotanypodini	*Clinotanypus*	*sp.*	2	50	4	6.90
BP-2-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	50	2	3.45
BP-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	50	2	3.45
BP-2-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	18	50	36	40.00
BP-2-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	7	50	14	15.56
BP-2-3	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	6	50	12	13.33
BP-2-3	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	2	50	4	4.44
BP-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*decorus*	2	50	4	4.44
BP-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	*Tanytarsus*	*sp.*	2	50	4	4.44
BP-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*stellatus*	2	50	4	4.44
BP-2-3	Arthropoda	Insecta	Odonata	Gomphidae			*Arigomphus*	*sp.*	1	50	2	2.22
BP-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Cladopelma*	*sp.*	1	50	2	2.22
BP-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Coelotanypodini	*Clinotanypus*	*sp.*	1	50	2	2.22
BP-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Procladiini	*Procladius*	*sp.*	1	50	2	2.22
BP-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	50	2	2.22
BP-2-3	Arthropoda	Insecta	Diptera	Tipulidae			*Tipulidae (family)*		1	50	2	2.22
BP-3-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	42	100	42	50.00
BP-3-1	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	16	100	16	19.05
BP-3-1	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	9	100	9	10.71
BP-3-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	5	100	5	5.95
BP-3-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	4	100	4	4.76
BP-3-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Cryptochironomus*	*fulvus*	3	100	3	3.57
BP-3-1	Arthropoda	Insecta	Odonata	Libellulidae			*Perithemis*	*sp.*	2	100	2	2.38
BP-3-1	Annelida	Oligochaeta	Tubificida	Naididae			*Aulodrilus*	*pigueti*	1	100	1	1.19
BP-3-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Coelotanypodini	*Clinotanypus*	*sp.*	1	100	1	1.19
BP-3-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp.*	1	100	1	1.19
BP-3-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	7	100	7	43.75
BP-3-2	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	2	100	2	12.50
BP-3-2	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	1	100	1	6.25
BP-3-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	100	1	6.25
BP-3-2	Arthropoda	Insecta	Odonata	Libellulidae			*Plathemis*	*sp.*	1	100	1	6.25
BP-3-2	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	*Tanytarsus*	*sp.*	1	100	1	6.25
BP-3-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	100	1	6.25
BP-3-2	Arthropoda	Insecta	Odonata	Libellulidae			*Perithemis*	*sp.*	1	100	1	6.25
BP-3-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp.*	1	100	1	6.25
BP-3-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	36	100	36	70.59
BP-3-3	Annelida	Oligochaeta	Tubificida	Naididae			*Branchiura*	*sowerbyi*	5	100	5	9.80
BP-3-3	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	3	100	3	5.88
BP-3-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	2	100	2	3.92
BP-3-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia*	*sp.*	1	100	1	1.96
BP-3-3	Arthropoda	Insecta	Diptera	Chaoboridae			*Chaoborus*	*punctipennis*	1	100	1	1.96
BP-3-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Cryptochironomus*	*fulvus*	1	100	1	1.96
BP-3-3	Arthropoda	Insecta	Odonata	Libellulidae			*Perithemis*	*sp.*	1	100	1	1.96
BP-3-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	100	1	1.96
PDC-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	71	100	71	89.87
PDC-1-1	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	2	100	2	2.53
PDC-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Ilyodrilus*	*templetoni*	2	100	2	2.53
PDC-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Psammoryctides*	*californianus*	2	100	2	2.53
PDC-1-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	100	1	1.27
PDC-1-1	Arthropoda	Insecta	Diptera	Chaoboridae			*Chaoborus*	*punctipennis*	1	100	1	1.27
PDC-1-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	4	100	4	66.67
PDC-1-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	1	100	1	16.67
PDC-1-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia*	*sp.*	1	100	1	16.67
PDC-1-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	4	100	4	57.14
PDC-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	2	100	2	28.57
PDC-1-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	100	1	14.29

Appendix D
Benthic Macroinvertebrate Data for Dead Creek Sector F, the Borrow Pit Lake, and Reference Areas
Sauget Area I

Station ID	Phylum	Class	Order	Family	Sub-Family	Tribe	Genus	Species	Number of Organisms Counted	Amount of Sample Analyzed (%)	Sample Total	Relative Abundance (Percent)
PDC-2-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	3	100	3	75.00
PDC-2-1	Mollusca	Pelecypoda	Prionodesmacea	Unionidae			*Lampsilis*	*sp*	1	100	1	25.00
PDC-2-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	30	100	30	83.33
PDC-2-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Ilyodrilus*	*templetoni*	3	100	3	8.33
PDC-2-2	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	1	100	1	2.78
PDC-2-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Psammoryctides*	*californianus*	1	100	1	2.78
PDC-2-2	Arthropoda	Crustacea	Decapoda	Palaemonidae			*Palaemonetes*	*kadiakensis*	1	100	1	2.78
PDC-2-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	49	50	98	90.74
PDC-2-3	Arthropoda	Insecta	Diptera	Chaoboridae			*Chaoborus*	*punctipennis*	2	50	4	3.70
PDC-2-3	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	1	50	2	1.85
PDC-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*decorus*	1	50	2	1.85
PDC-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Procladiini	*Procladius*	*sp*	1	50	2	1.85
REF2-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	149	10	1490	90.85
REF2-1-1	Arthropoda	Insecta	Diptera	Ephydridae			*Ephydra*	*subopaca*	6	10	60	3.66
REF2-1-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	2	10	20	1.22
REF2-1-1	Arthropoda	Crustacea	Decapoda	Palaemonidae			*Palaemonetes*	*kadiakensis*	2	10	20	1.22
REF2-1-1	Mollusca	Gastropoda	Basommatophora	Physidae			*Physella*	*heterostropha*	2	10	20	1.22
REF2-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Nais*	*variabilis*	1	10	10	0.61
REF2-1-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*udekemianus*	1	10	10	0.61
REF2-1-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp*	1	10	10	0.61
REF2-1-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	116	10	1160	89.16
REF2-1-2	Mollusca	Gastropoda	Basommatophora	Physidae			*Physella*	*heterostropha*	3	10	30	2.33
REF2-1-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp*	2	10	20	1.55
REF2-1-2	Arthropoda	Insecta	Hemiptera	Corixidae	Corixinae		*Trichocorixa*	*sp*	2	10	20	1.55
REF2-1-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	2	10	20	1.55
REF2-1-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Psammoryctides*	*californianus*	1	10	10	0.78
REF2-1-2	Annelida	Oligochaeta	Tubificida	Naididae			*Aulodrilus*	*pluriseta*	1	10	10	0.78
REF2-1-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp*	1	10	10	0.78
REF2-1-2	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Culicoides*	*sp.*	1	10	10	0.78
REF2-1-2	Arthropoda	Insecta	Hemiptera	Corixidae			*Sigara*	*sp.*	1	10	10	0.78
REF2-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Culicoides*	*sp.*	60	10	600	40.27
REF2-1-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	50	10	500	33.56
REF2-1-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	28	10	280	18.79
REF2-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp*	5	10	50	3.36
REF2-1-3	Annelida	Oligochaeta	Tubificida	Naididae			*Aulodrilus*	*pluriseta*	2	10	20	1.34
REF2-1-3	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	1	10	10	0.67
REF2-1-3	Arthropoda	Insecta	Hemiptera	Corixidae	Corixinae		*Trichocorixa*	*sp.*	1	10	10	0.67
REF2-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia*	*sp.*	1	10	10	0.67
REF2-1-3	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp.*	1	10	10	0.67
REF2-2-1	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	22	100	22	59.46
REF2-2-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon*	*sp.*	8	100	8	21.62
REF2-2-1	Annelida	Oligochaeta	Tubificida	Naididae			*Dero*	*digitata*	1	100	1	2.70
REF2-2-1	Annelida	Oligochaeta	Tubificida	Naididae			*Aulodrilus*	*pigueti*	1	100	1	2.70
REF2-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	100	1	2.70
REF2-2-1	Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias*	*sp.*	1	100	1	2.70
REF2-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	*Tanytarsus*	*sp.*	1	100	1	2.70
REF2-2-1	Arthropoda	Insecta	Diptera	Tipulidae			*Ormosia*	*sp.*	1	100	1	2.70
REF2-2-1	Arthropoda	Insecta	Diptera	Chironomidae	Orthocladiinae	Orthocladiini	*Psectrocladius*	*sp.*	1	100	1	2.70
REF2-2-2	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	13	100	13	92.86
REF2-2-2	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Pentaneurini	*Ablabesmyia*	*annulata*	1	100	1	7.14
REF2-2-3	Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus*	*hoffmeisteri*	25	100	25	69.44
REF2-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus*	*salinarius*	8	100	8	22.22
REF2-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Polypedilum*	*scalaenum*	1	100	1	2.78
REF2-2-3	Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Tanypodini	*Tanypus*	*neopunctipennis*	1	100	1	2.78
REF2-2-3	Arthropoda	Insecta	Hemiptera	Corixidae	Corixinae		*Trichocorixa*	*sp.*	1	100	1	2.78

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 13012
Client Sample ID : F-1-1-"CREEK SECTOR F-1"
Remarks :

Date/Time Sample Collected : 10/7/99 @ 3:00:00 P
Percent Sample Examined : 50
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Haemonais waldvogeli*	1
			Tubificidae			*Branchiura sowerbyi*	3
						Limnodrilus claparedianus	1
llusca	Pelecypoda	Prionodesmacea	Sphaeriidae			*Sphaerium sp.*	2
Arthropoda	Insecta	Coleoptera	Hydrophilidae			*Hydrochus sp.*	1
		Diptera	Ceratopogonidae			*Ceratopogon sp.*	1
						Culicoides sp.	3
			Chironomidae	Chironominae	Chironomini	*Chironomus sp.*	1
						Chironomus decorus	1
						Einfeldia sp.	4
						Polypedilum illinoense	5
				Tanypodinae	Tanypodini	*Tanypus carinatus*	1
		Hemiptera	Pleidae			*Neoplea sp.*	1
		Lepidoptera	Pyralidae			*Acentria sp.*	1
						Sub-Total:	26
						Grand Total:	26

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Charlie Menzie		**Date**	**: 12/23/99**
Menzie-Cura & Associates		**BTR No.**	**: 03703**
1 Courthouse Lane		**Project No.**	**: 99033**
Chelmsford, MA 01824		**No. of Samples**	**: 69**
		Date Received	**: 10/26/99**

Reference: SAUGET,IL

Laboratory Sample ID	: 13013	**Date/Time Sample Collected**	: 10/7/99 @ 3:00:00 P
Client Sample ID	: F-1-2-"CREEK SECTOR F-1"	**Percent Sample Examined**	: 50
Remarks	:	**Sampling Depth (m)**	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus claparedianus*	1
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			*Sphaerium sp.*	8
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	1
			Chironomidae	Chironominae	Chironomini	*Chironomus sp.*	[illegible]
						Polypedilum illinoense	[illegible]
						Sub-Total:	30
						Grand Total:	30

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Charlie Menzie		Date	: 12/23/99
Menzie-Cura & Associates		BTR No.	: 03703
1 Courthouse Lane		Project No.	: 99033
Chelmsford, MA 01824		No. of Samples	: 69
		Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 13014	Date/Time Sample Collected	: 10/7/99 @ 3:00:00 P
Client Sample ID	: F-1-3-"CREEK SECTOR F-1"	Percent Sample Examined	: 50
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	5
Mollusca	Pelecypoda	Prionodesmacea	Sphaeriidae			*Musculium sp.*	4
						Sphaerium sp.	3
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	1
						Culicoides sp.	4
			Chironomidae	Chironominae	Chironomini	*Chironomus sp.*	2
						Polypedilum illinoense	2
				Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	1
						Sub-Total:	22
						Grand Total:	22

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Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 13015
Client Sample ID : F-2-1-"CREEK SECTOR F-2"
Remarks :

Date/Time Sample Collected : 10/7/99 @ 4:10:00 P
Percent Sample Examined : 50
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	5
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia sp.*	1
						Ceratopogon sp.	3
						Sphaeromias sp.	[illegible]
			Chironomidae	Chironominae	Chironomini	*Chironomus sp.*	[illegible]
				Tanypodinae	Coelotanypodini	*Coelotanypus scapularis*	1
						Sub-Total:	18
						Grand Total:	18

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 13016
Client Sample ID : F-2-2-"CREEK SECTOR F-2"
Remarks :

Date/Time Sample Collected : 10/7/99 @ 4:10:00 P
Percent Sample Examined : 50
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	8
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	12
						Culicoides sp.	1
						Sphaeromias sp.	8
			Chironomidae	Chironominae	Chironomini	*Chironomus sp.*	2
						Polypedilum illinoense	1
				Tanypodinae		*Psectrotanypus sp.*	1
		Hemiptera	Mesoveliidae			*Mesovelia sp.*	1
			Pleidae			*Neoplea sp.*	2
						Sub-Total:	36
						Grand Total:	36

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Reference: SAUGET,IL

Date	: 12/23/99
BTR No.	: 03703
Project No.	: 99033
No. of Samples	: 69
Date Received	: 10/26/99

Laboratory Sample ID	: 13017	Date/Time Sample Collected	: 10/7/99 @ 4:10:00 P
Client Sample ID	: F-2-3-"CREEK SECTOR F-2"	Percent Sample Examined	: 50
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	9
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	11
						Sphaeromias sp.	2
			Chironomidae	Chironominae	Chironomini	*Polypedilum illinoense*	1
						Sub-Total:	2[illegible]
						Grand Total:	23

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Menzie-Cura & Associates		BTR No.	: 03703
1 Courthouse Lane		Project No.	: 99033
Chelmsford, MA 01824		No. of Samples	: 69
		Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 13018	Date/Time Sample Collected	: 10/7/99 @ 10:45:00
Client Sample ID	: F-3-1-"CREEK SECTOR F-3"	Percent Sample Examined	: 50
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	28
						Ilyodrilus templetoni	3
						Limnodrilus hoffmeisteri	14
thropoda	Insecta	Coleoptera	Dytiscidae			*Hygrotus sp.*	1
			Hydrophilidae			*Tropisternus sp.*	1
		Diptera	Ceratopogonidae			*Culicoides sp.*	1
			Chironomidae	Chironominae	Chironomini	*Polypedilum illinoense*	1
				Tanypodinae		*Krenopelopia sp.*	2
			Stratiomyidae			*Stratiomys sp.*	1
						Sub-Total:	52
						Grand Total:	52

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Menzie-Cura & Associates		**BTR No.**	: 03703
1 Courthouse Lane		**Project No.**	: 99033
Chelmsford, MA 01824		**No. of Samples**	: 69
		Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 13019	**Date/Time Sample Collected**	: 10/7/99 @ 10:45:00
Client Sample ID	: F-3-2-"CREEK SECTOR F-3"	**Percent Sample Examined**	: 50
Remarks	:	**Sampling Depth (m)**	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero vaga*	1
			Tubificidae			*Branchiura sowerbyi*	27
						Ilyodrilus templetoni	2
						Limnodrilus hoffmeisteri	[illegible]
Mollusca	Gastropoda	Basommatophora	Physidae			*Physella heterostropha*	[illegible]
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Sphaeromias sp.*	1
			Chironomidae	Chironominae	Chironomini	*Polypedilum illinoense*	2
			Tipulidae				1
		Hemiptera	Corixidae	Corixinae		*Trichocorixa sp.*	1
						Sub-Total:	**68**
						Grand Total:	**68**

Submitted By: Philip C Downey

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Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12965
Client Sample ID : F-3-3-"CREEK SECTOR F-3"
Remarks :

Date/Time Sample Collected : 10/7/99 @ 10:45:00
Percent Sample Examined : 50
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	26
						Limnodrilus hoffmeisteri	11
Mollusca	Gastropoda	Basommatophora	Physidae			*Physella heterostropha*	1
ropoda	Insecta	Diptera					3
			Ceratopogonidae			*Ceratopogon sp.*	1
						Sphaeromias sp.	3
			Chironomidae	Chironominae	Chironomini	*Polypedilum illinoense*	10
				Tanypodinae		*Krenopelopia sp.*	3
			Tipulidae			*Limonia sp.*	1
						Sub-Total:	59
						Grand Total:	59

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Date	: 12/23/99
BTR No.	: 03703
Project No.	: 99033
No. of Samples	: 69
Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12985	**Date/Time Sample Collected**	: 10/6/99 @ 11:30:00
Client Sample ID	: BP-1-1-"BORROW PIT LAKE-1"	**Percent Sample Examined**	: 50
Remarks	:	**Sampling Depth (m)**	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae			*Mooreobdella microstoma*	1
	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	3
						Limnodrilus hoffmeisteri	3
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	[illegible]
			Chironomidae	Tanypodinae	Natarsini	*Natarsia sp.*	[illegible]
					Tanypodini	*Tanypus neopunctipennis*	1
		Hemiptera	Corixidae			*Palmacorixa sp.*	2
		Odonata	Libellulidae			*Perithemis sp.*	5
						Sub-Total:	17
						Grand Total:	17

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Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12986
Client Sample ID : *BP-1-2-"BORROW PIT LAKE -1"*
Remarks :

Date/Time Sample Collected : 10/6/99 @ 11:30:00
Percent Sample Examined : *50*
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae			*Mooreobdella microstoma*	2
	Oligochaeta	Tubificida	Naididae			*Dero digitata*	3
			Tubificidae			*Aulodrilus pigueti*	1
						Branchiura sowerbyi	1
						Limnodrilus hoffmeisteri	4
Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Cryptotendipes sp.*	1
				Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	2
		Ephemeroptera	Caenidae			*Caenis sp.*	2
		Hemiptera	Corixidae			*Palmacorixa sp.*	3
		Odonata	Gomphidae			*Arigomphus sp.*	1
			Libellulidae			*Perithemis sp.*	2
		Trichoptera	Hydroptilidae	Hydroptilinae		*Hydroptila ajax*	1
						Sub-Total:	23
						Grand Total:	23

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Chelmsford, MA 01824		No. of Samples	: 69
		Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12987	Date/Time Sample Collected	: 10/6/99 @ 11:30:00
Client Sample ID	: BP-1-3-"BORROW PIT LAKE-1"	Percent Sample Examined	: 50
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Nematoda		Dorylaimida				*Alaimus sp.*	1
Annelida	Hirudinea	Pharyngobdellida	Erpobdellidae			*Mooreobdella microstoma*	1
	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	1
						Ilyodrilus templetoni	1
						Limnodrilus hoffmeisteri	
Arthropoda	Insecta	Coleoptera	Hydrophilidae			*Berosus sp.*	1
		Diptera	Ceratopogonidae			*Ceratopogon sp.*	2
			Chironomidae	Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	1
		Ephemeroptera	Caenidae			*Caenis sp.*	1
		Hemiptera	Corixidae	Corixinae		*Trichocorixa sp.*	5
		Odonata	Libellulidae			*Perithemis sp.*	2
						Sub-Total:	23
						Grand Total:	23

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Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12995
Client Sample ID : BP-2-1-"BORROW PIT LAKE-2"
Remarks :

Date/Time Sample Collected : 10/6/99 @ 9:30:00 A
Percent Sample Examined : 50
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	6
			Tubificidae			*Aulodrilus pigueti*	4
						Branchiura sowerbyi	2
						Ilyodrilus templetoni	5
						Limnodrilus hoffmeisteri	27
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	3
						Culicoides sp.	1
			Chironomidae	Chironominae	Chironomini	*Chironomus salinarius*	1
				Tanypodinae	Coelotanypodini	*Clinotanypus sp.*	2
					Tanypodini	*Tanypus neopunctipennis*	2
						Tanypus stellatus	3
		Odonata	Gomphidae			*Arigomphus sp.*	1
						Sub-Total:	57
						Grand Total:	57

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Date	: 12/23/99
BTR No.	: 03703
Project No.	: 99033
No. of Samples	: 69
Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12988	Date/Time Sample Collected	: 10/6/99 @ 9:30:00 A
Client Sample ID	: BP-2-2-"BORROW PIT LAKE-2"	Percent Sample Examined	: 50
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Branchiura sowerbyi*	2
						Ilyodrilus templetoni	4
						Limnodrilus hoffmeisteri	13
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	1
			Chironomidae	Chironominae	Chironomini	*Chironomus salinarius*	[illegible]
				Tanypodinae	Coelotanypodini	*Clinotanypus sp.*	2
					Procladiini	*Procladius sp.*	3
					Tanypodini	*Tanypus neopunctipennis*	1
						Sub-Total:	**29**
						Grand Total:	**29**

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Charlie Menzie		Date	: 12/23/99
Menzie-Cura & Associates		BTR No.	: 03703
1 Courthouse Lane		Project No.	: 99033
Chelmsford, MA 01824		No. of Samples	: 69
		Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12989	Date/Time Sample Collected	: 10/6/99 @ 9:30:00 A
Client Sample ID	: BP-2-3-"BORROW PIT LAKE-2"	Percent Sample Examined	: 50
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	6
			Tubificidae			*Branchiura sowerbyi*	2
						Limnodrilus hoffmeisteri	18
...hropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	7
			Chironomidae	Chironominae	Chironomini	*Chironomus decorus*	2
						Cladopelma sp.	1
					Tanytarsini	*Tanytarsus sp.*	2
				Tanypodinae	Coelotanypodini	*Clinotanypus sp.*	1
					Procladiini	*Procladius sp.*	1
					Tanypodini	*Tanypus neopunctipennis*	1
						Tanypus stellatus	2
			Tipulidae				1
		Odonata	Gomphidae			*Arigomphus sp.*	1
						Sub-Total:	**45**
						Grand Total:	**45**

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Date	: 12/23/99
BTR No.	: 03703
Project No.	: 99033
No. of Samples	: 69
Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12992	Date/Time Sample Collected	: 10/6/99 @ 4:30:00 P
Client Sample ID	: BP-3-1-"BORROW PIT LAKE-3"	Percent Sample Examined	: 100
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	16
			Tubificidae			*Aulodrilus pigueti*	1
						Branchiura sowerbyi	9
						Limnodrilus hoffmeisteri	4[illegible]
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	[illegible]
						Sphaeromias sp.	1
			Chironomidae	Chironominae	Chironomini	*Cryptochironomus fulvus*	3
				Tanypodinae	Coelotanypodini	*Clinotanypus sp.*	1
					Tanypodini	*Tanypus neopunctipennis*	4
		Odonata	Libellulidae			*Perithemis sp.*	2
						Sub-Total:	84
						Grand Total:	84

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Reference: SAUGET,IL

Date	**: 12/23/99**
BTR No.	**: 03703**
Project No.	**: 99033**
No. of Samples	**: 69**
Date Received	**: 10/26/99**

Laboratory Sample ID	: 12990	Date/Time Sample Collected	: 10/6/99 @ 4:30:00 P
Client Sample ID	: BP-3-2-"BORROW PIT LAKE-3"	Percent Sample Examined	: 100
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	1
			Tubificidae			*Branchiura sowerbyi*	2
						Limnodrilus hoffmeisteri	7
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	1
						Sphaeromias sp.	1
			Chironomidae	Chironominae	Tanytarsini	*Tanytarsus sp.*	1
				Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	1
		Odonata	Libellulidae			*Perithemis sp.*	1
						Plathemis sp.	1
						Sub-Total:	16
						Grand Total:	16

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Chelmsford, MA 01824		No. of Samples	: 69
		Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12991	Date/Time Sample Collected	: 10/6/99 @ 4:30:00 P
Client Sample ID	: BP-3-3-"BORROW PIT LAKE-3"	Percent Sample Examined	: 100
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	3
			Tubificidae			*Branchiura sowerbyi*	5
						Limnodrilus hoffmeisteri	36
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia sp.*	1
						Ceratopogon sp.	1
			Chaoboridae			*Chaoborus punctipennis*	1
			Chironomidae	Chironominae	Chironomini	*Cryptochironomus fulvus*	1
				Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	1
		Odonata	Libellulidae			*Perithemis sp*	1
						Sub-Total:	**51**
						Grand Total:	**51**

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Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12979
Client Sample ID : PDC-1-1-"PRARIE DUPONT CREEK-1"
Remarks :

Date/Time Sample Collected : 10/8/99 @ 9:30:00 A
Percent Sample Examined : 100
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	2
			Tubificidae			*Ilyodrilus templetoni*	2
						Limnodrilus hoffmeisteri	71
						Psammoryctides californianus	2
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	1
			Chaoboridae			*Chaoborus punctipennis*	1
						Sub-Total:	79
						Grand Total:	79

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Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12980
Client Sample ID : PDC-1-2-"PRARIE DUPONT CREEK-1"
Remarks :

Date/Time Sample Collected : 10/8/99 @ 9:30:00 A
Percent Sample Examined : 100
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus hoffmeisteri*	4
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia sp.*	1
						Ceratopogon sp.	1
						Sub-Total:	6
						Grand Total:	

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Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12981
Client Sample ID : *PDC-1-3-"PRARIE DUPONT CREEK-1"*
Remarks :

Date/Time Sample Collected : 10/8/99 @ 9:30:00 A
Percent Sample Examined : 100
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus hoffmeisteri*	4
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	2
			Chironomidae	Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	1
						Sub-Total:	7
						Grand Total:	7

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Date	: 12/23/99
BTR No.	: 03703
Project No.	: 99033
No. of Samples	: 69
Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12982	Date/Time Sample Collected	: 10/8/99 @ 11:20:00
Client Sample ID	: PDC-2-1-"PRARIE DUPONT CREEK-2"	Percent Sample Examined	: 100
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus hoffmeisteri*	3
Mollusca	Pelecypoda	Prionodesmacea	Unionidae			*Lampsilis sp.*	1
						Sub-Total:	4
						Grand Total:	4

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Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12983
Client Sample ID : PDC-2-2-"PRARIE DUPONT CREEK-2"
Remarks :

Date/Time Sample Collected : 10/8/99 @ 11:20:00
Percent Sample Examined : 100
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	1
			Tubificidae			*Ilyodrilus templetoni*	3
						Limnodrilus hoffmeisteri	30
						Psammoryctides californianus	1
Arthropoda	Crustacea	Decapoda	Palaemonidae			*Palaemonetes kadiakensis*	1
						Sub-Total:	36
						Grand Total:	36

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Aquatec Biological Sciences

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12984
Client Sample ID : PDC-2-3-"PRARIE DUPONT CREEK-2"
Remarks :

Date/Time Sample Collected : 10/8/99 @ 11:20:00
Percent Sample Examined : 50
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	1
			Tubificidae			*Limnodrilus hoffmeisteri*	49
Arthropoda	Insecta	Diptera	Chaoboridae			*Chaoborus punctipennis*	2
			Chironomidae	Chironominae	Chironomini	*Chironomus decorus*	1
				Tanypodinae	Procladiini	*Procladius sp.*	
						Sub-Total:	54
						Grand Total:	54

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Charlie Menzie		Date	: 12/23/99
Menzie-Cura & Associates		BTR No.	: 03703
1 Courthouse Lane		Project No.	: 99033
Chelmsford, MA 01824		No. of Samples	: 69
		Date Received	: 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID	: 12973	Date/Time Sample Collected	: 10/8/99 @ 2:30:00 P
Client Sample ID	: REF2-1-1-"REFERENCE LOCATION 2-1"	Percent Sample Examined	: 10
Remarks	:	Sampling Depth (m)	: Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Nais variabilis*	1
			Tubificidae			*Limnodrilus hoffmeisteri*	149
						Limnodrilus udekemianus	1
llusca	Gastropoda	Basommatophora	Physidae			*Physella heterostropha*	2
Arthropoda	Crustacea	Decapoda	Palaemonidae			*Palaemonetes kadiakensis*	2
	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	1
			Chironomidae	Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	2
			Ephydridae			*Ephydra subopaca*	6
						Sub-Total:	**164**
						Grand Total:	**164**

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12974
Client Sample ID : REF2-1-2-"REFERENCE LOCATION 2-1"
Remarks :

Date/Time Sample Collected : 10/8/99 @ 2:30:00 P
Percent Sample Examined : 10
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Aulodrilus pluriseta*	1
						Limnodrilus hoffmeisteri	115
						Psammoryctides californianus	1
Mollusca	Gastropoda	Basommatophora	Physidae			*Physella heterostropha*	[illegible]
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	[illegible]
						Culicoides sp.	1
						Sphaeromias sp.	1
			Chironomidae	Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	2
		Hemiptera	Corixidae			*Sigara sp.*	1
				Corixinae		*Trichocorixa sp.*	2
						Sub-Total:	129
						Grand Total:	129

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12975
Client Sample ID : REF2-1-3-"REFERENCE LOCATION 2-1"
Remarks :

Date/Time Sample Collected : 10/8/99 @ 2:30:00 P
Percent Sample Examined : 10
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	1
			Tubificidae			*Aulodrilus pluriseta*	2
						Limnodrilus hoffmeisteri	50
ropoda	Insecta	Diptera	Ceratopogonidae			*Bezzia sp.*	1
						Ceratopogon sp.	5
						Culicoides sp.	60
						Sphaeromias sp.	1
			Chironomidae	Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	28
		Hemiptera	Corixidae	Corixinae		*Trichocorixa sp.*	1
						Sub-Total:	149
						Grand Total:	149

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12976
Client Sample ID : REF2-2-1-"REFERENCE LOCATION 2-2"
Remarks :

Date/Time Sample Collected : 10/9/99 @ 10:30:00
Percent Sample Examined : 100
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Naididae			*Dero digitata*	1
			Tubificidae			*Aulodrilus pigueti*	1
						Limnodrilus hoffmeisteri	22
Arthropoda	Insecta	Diptera	Ceratopogonidae			*Ceratopogon sp.*	[illegible]
						Sphaeromias sp.	[illegible]
			Chironomidae	Chironominae	Tanytarsini	*Tanytarsus sp.*	1
				Orthocladiinae	Orthocladiini	*Psectrocladius sp.*	1
				Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	1
			Tipulidae			*Ormosia sp.*	1
						Sub-Total:	37
						Grand Total:	37

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12977
Client Sample ID : REF-2-2-"REFERENCE LOCATION 2-2"
Remarks :

Date/Time Sample Collected : 10/9/99 @ 10:30:00
Percent Sample Examined : 100
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus hoffmeisteri*	13
Arthropoda	Insecta	Diptera	Chironomidae	Tanypodinae	Pentaneurini	*Ablabesmyia annulata*	1
						Sub-Total:	14
						Grand Total:	14

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Charlie Menzie
Menzie-Cura & Associates
1 Courthouse Lane
Chelmsford, MA 01824

Date : 12/23/99
BTR No. : 03703
Project No. : 99033
No. of Samples : 69
Date Received : 10/26/99

Reference: SAUGET,IL

Laboratory Sample ID : 12978
Client Sample ID : REF-2-3-"REFERENCE LOCATION 2-2"
Remarks :

Date/Time Sample Collected : 10/9/99 @ 10:30:00
Percent Sample Examined : 100
Sampling Depth (m) : Not Reported

Phylum	Class	Order	Family	Sub-Family	Tribe	Genus/Species/Variety	# Counted
Annelida	Oligochaeta	Tubificida	Tubificidae			*Limnodrilus hoffmeisteri*	25
Arthropoda	Insecta	Diptera	Chironomidae	Chironominae	Chironomini	*Chironomus salinarius*	8
						Polypedilum scalaenum	1
				Tanypodinae	Tanypodini	*Tanypus neopunctipennis*	1
		Hemiptera	Corixidae	Corixinae		*Trichocorixa sp.*	1
						Sub-Total:	36
						Grand Total:	36

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APPENDIX E

SUMMARY OF SEDIMENT TOXICITY TESTING RESULTS

Results of *Hyalella azteca* Survival and Growth Sediment Toxicity Tests Conducted on Sediment Samples from Dead Creek / Sauget, Illinois

Reference BTRs 3615, 3622, 3629, 3633, 3641, 3643

Prepared for:
Menzie-Cura & Associates
1 Courthouse Lane, Suite 2
Chelmsford, MA 01824

Prepared by:
Aquatec Biological Sciences
75 Green Mountain Drive
South Burlington, Vermont

December 1999

Aquatec Biological Sciences

Ecology Environmental Toxicology Natural Resource Assessments Microbiology

BTRS 3615, 3622, 3629, 3633, 3641, 3643

PROJECT: 99033

I have reviewed this data package, which was completed under my supervision. This data package is complete, and to the best of my ability, accurately reflects the conditions and the results of the reported tests.

John W. Williams
Toxicity Laboratory Manager

12/6/99
Date

I have reviewed and discussed this data package with the responsible laboratory manager. Based on this review, the data package was, to the best of my knowledge and belief, conducted in accordance with established company quality assurance procedures.

Philip C Downey
Philip C. Downey, Ph.D.
Director

12/14/99
Date

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LIST OF APPENDICES

EXECUTIVE SUMMARY

100.1HASG Amphipod, *Hyalella azteca* 10 Day Survival and Growth Test
Conducted October 7 - October 31, 1999
for Menzie-Cura & Associates
Dead Creek Site

Laboratory Sample ID	Client Sample ID	Mean Survival (%)	Mean Dry Weight (mg)
12546	BTOX-C-1	90	0.080*
12547	BTOX-C-2	71	0.064*
12548	BTOX-C-3	68*	--
12549	BTOX-D-1	90	0.172
12550	BTOX-D-2	88	0.134*
12551	BTOX-D-3	90	0.168
12552	Laboratory Control Sediment	86	0.223
12589	BTOX-B-1	16*	--
12590	BTOX-B-1 (DUPE)	19*	--
12591	BTOX-B-2	1*	--
12592	BTOX-B-3	64*	--
12593	BTOX-M	10*	--
12609	E-1 Dead Creek	23*	--
12610	E-2 Dead Creek	76	0.664
12611	E-3 Dead Creek	85	0.141*
12612	BP-1 Borrow Pit	89	0.156*
12613	BP-1 Borrow Pit (DUPE)	94	0.154*
12614	BP-3 Borrow Pit	91	0.154*
12622	Laboratory Control Sediment	86	0.202
12638	BP-2 Borrow Pit	96	0.172
12639	F-1 Dead Creek Section F	91	0.221
12640	F-2 Dead Creek Section F	86	0.219
12641	F-3 Dead Creek Section F	83	0.183
12664	Prairie DuPont Creek	98	0.254
12665	Prairie DuPont Creek 2	98	0.404
12666	Reference Creek	98	0.393
12668	Laboratory Control Sediment	98	0.268
12671	Ref 2-2 Reference Borrow Pit	98	0.335

* The response data were statistically significantly different from the corresponding laboratory control sediment ($p \leq 0.05$)

-- When a significant reduction in survival was detected, mean dry weight data were only reported in Appendix A (See Results)

INTRODUCTION:

Samples were received for toxicity testing at Aquatec Biological Sciences of 75 Green Mountain Drive, South Burlington, Vermont. Tests were conducted at Aquatec Biological Sciences. The results of the following tests are reported:

Client:	Menzie-Cura & Associates
Facility/Location:	Dead Creek / Sauget, IL
Initial Sampling Date:	October 4 - October 9, 1999
Testing Date:	October 7 – October 31 , 1999
Tests Conducted:	Amphipod, *Hyalella azteca* , 10-day Survival and Growth

METHODS:

The procedures followed in conducting these toxicity tests were based on methods described by the USEPA (EPA 600/R-94/024). Test conditions for *Hyalella azteca* are listed in Table 1. Testing was begun in four separate groupings based upon chronological sequencing from the time of sediment collection. The objective for the test groupings was to complete the 10-day acute tests prior to expiration of a 14-day sediment storage time so that subsequent chronic toxicity tests could be started within a 14-day time frame. The first testing group was initiated on October 7, 1999. The second testing group was initiated on October 8, 1999. The third testing group was initiated on October 9, 1999. The fourth testing group was initiated on October 10, 1999. A laboratory control (artificial sediment) was included with each testing group.

Due to unacceptable survival in the both field and laboratory samples, the first three testing groups were combined into two testing groups and were retested, beginning on October 19, 1999 and October 21, 1999, within the project-specific sample holding time. The laboratory control associated with the October 10, 1999 testing group met survival acceptability criteria, therefore acute toxicity testing of samples associated with this testing group was not repeated.

Sediment Preparation

The samples were stored refrigerated and in the dark whenever they were not being used in preparation for testing. Sediments distributed in test beakers were examined for the presence of indigenous organisms which were removed when observed. Also, large pieces of vegetative material (e.g., leaf litter, sticks, grass) were removed. Qualitative observations regarding the sediment type and indigenous organisms removed were recorded. A laboratory control sediment was used with each Sample Delivery Group. The laboratory control sediment (artificial sediment) was prepared following formulations specified in the USEPA protocols and then hydrated prior to distribution to test chambers. Sediments were then distributed to individual replicate test chambers, overlying water was added, and the overlying water renewal system was activated. The unused portion of each sample (in the original sample container) was returned to refrigerated storage.

Statistical Analysis

Statistical comparisons were performed against the concurrent laboratory control. The growth measurement was based upon average dry weight of surviving amphipods per replicate, following the USEPA protocol for the test method. This procedure can result in inflated average dry weights for samples with significantly low survival. Statistical significance for any sample was based upon the most sensitive endpoint (survival or growth). An F-Test was performed to test for equality of variances between each sample comparison to the control. If variances were not significantly different, paired T-Tests with equal variances were used to determine whether there were significant reductions in mean survival (Arcsin transformed) and/or mean growth in each sample relative to the control. If the variance between a sample and control comparison was significantly different, paired T-Tests with unequal variances were used to determine significant reductions in mean survival and/or growth.

<u>**PROTOCOL DEVIATIONS:**</u>

Surviving amphipods in four test replicates (Samples 12546D, 12550C, 12590D, and 12611B) were not measured for growth (replicate dry weight) due to an apparent laboratory error.

Replicate G of Sample 12590 was scored as having one amphipod surviving on Day 10, however, according to the laboratory documentation, two amphipods from this replicate were weighed for growth determination.

Sample 12547, Replicate H had two surviving amphipods recovered on Day 10. A large dragonfly nymph was also found in this replicate, leading to the possibility that amphipod predation had occurred.

Sample 12609 had an unusual characteristic in the laboratory, in that the sediment expanded within the test beakers. In one replicate (Replicate D), a portion of the sediment separated and floated to the water surface. On Day 10 the measured dissolved oxygen below this separation layer was measured to be 2.0 mg/L

RESULTS:

Summary result tabulations for the *Hyalella azteca* whole sediment toxicity tests are located in Appendix A.

Group 1 Test Results: This group included samples 12546 (BTOX-C-1), 12547 (BTOX-C-2), 12548 (BTOX-C-3), 12549 (BTOX-D-1), 12550 (BTOX-D-2), 12551 (BTOX-D-3), 12589 (BTOX-B-1), 12590 (BTOX-B-1 duplicate), 12591 (BTOX-B-2), 12592 (BTOX-B-3), 12593 (BTOX-M), 12609 (E-1 Dead Creek), and 12610 (E-2 Dead Creek). Samples 12548, 12589, 12590, 12591, 12592, 12593, and 13609 had survival responses that were significantly less than the Laboratory Control Sample (12552). Samples 12546, 12547, and 12550 had growth responses that were significantly less than the Laboratory Control Sample (12552).

Group 2 Test Results: This group included samples 12611 (E-3 Dead Creek), 12612 (BP-1 Borrow Pit), 12613 (BP-1 Borrow Pit duplicate), and 12614 (BP-3 Borrow Pit), 12638 (BP-2 Borrow Pit), 12639 (F-1 Dead Creek Section F) 12640 (F-2 Dead Creek Section F), 12641 (F-3 Dead Creek Section F). None of the samples in this testing group had survival responses that were significantly less than the Laboratory Control Sample (12622). Samples 12611, 12612. 12613. and 12614 had growth responses that were significantly less than the Laboratory Control Sample (12622).

<u>Group 3 Test Results:</u> This group included samples 12664 (Prairie DuPont Creek). 12665 (Prairie DuPont Creek 2). 12666 (Reference Creek). and 12671 (Ref 2-2 Reference Borrow Pit). The survival and growth responses in all the samples in this testing group were not significantly less than the Labortory Control Sample (12668

<u>Total Ammonia and Sulfide</u>: Total ammonia concentrations were less than 25 mg/L in all porewaters and less than 7 mg/L in overlying water. Total sulfide was not detected (<0.5 mg/L) in any porewater samples. therefore. testing fo sulfide in overlying water was not conducted.

<u>QUALITY ASSURANCE:</u>

A standard reference toxicant SRT test was conducted concurrently with each batch of *Hyalella azteca*. The resulting LC50 values fell within control chart limits and were viewed as being acceptable.

Table 1. Test Conditions for the Amphipod (*Hyalella azteca*) 10-day Whole Sediment Survival and Growth Toxicity Test.

ASSOCIATED PROTOCOL: EPA, 1994. *Methods for Measuring the Toxicity and Bioaccummulation of Sediment-associated Contaminants with Freshwater Invertebrates Method 100.1 (EPA/600/R-94/024).*

1. Test type:	Whole-sediment toxicity (static renewal)
2. Test temperature:	23 ± 1°C
3. Light quality:	Wide-spectrum fluorescent lights
4. Light illuminance:	500 to 1000 lux
5. Photoperiod:	16 hr. light, 8 hr. dark
6. Test chamber size:	300 mL beaker
7. Sediment volume:	100 mL (distributed to test chambers on the day prior to administration of test organisms
8. Overlying water volume:	175 mL
9. Renewal of overlying water :	At least twice daily
10. Age of test organisms:	7-14 days old at the start of the test
11. Number of organisms / test chamber:	10
12. Number of replicate test chambers / treatment:	8
13. Feeding regime:	1.5 mL YCT daily
14. Aeration:	None unless dissoved oxygen in overlying water drops below 40% saturation or demonstrates a declining trend during daily monitoring. If required, aeration will be sufficiently gentle to prevent resuspension of sediments to the overlying water. Additional water renewals may be used in lieu of aeration.
15. Overlying water:	Reconstituted water (EPA/600/R-94/024)

Table 2. Test Conditions for the Amphipod (*Hyalella azteca*) 10-Day Whole Sediment Survival and Growth Toxicity Test (continued).

16. Control sediment:	Formulated sediment (EPA/600/R-94/024, section 7.2.3.2)
17. Test chamber cleaning:	Overflow screens daily
18. Monitoring:	
Overlying water	
Temperature	Daily
Dissolved oxygen	Daily
pH	Beginning and end of test
Conductivity	Beginning and end of test
Alkalinity	Beginning and end of test
Hardness	Beginning and end of test
Ammonia	Beginning and end of test
Organism behavior	Within 2 hours to remove "floaters"
19. Test duration:	10 days
20. End points:	Survival and growth (dry weight to 0.01 mg, 60°C overnight). by replicate
21. Reference toxicant:	96-h acute. water only (KCl)
22. Test acceptability:	Minimum mean control survival of 80% and performance-based criteria outlined in EPA/600/R-94/024. Table 11.3
23. Statistical analysis and data interpretation:	Arc-sine (square-root) transformation of survival data. F-Tests were performed for equality of variance. Paired T-Tests were performed versus the negative control for survival and growth.

APPENDIX: A

Summary of Statistical Tests and Probabilities
Dead Creek *Hyalella azteca* Acute Toxicity Test
BTR: 3615a

		Survival				Growth			
Day 10		Proportion Surviving	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant	Average Weight(mg)	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant
12552	Control	0.86				0.223			
12546	Sample	0.90	0.684	0.241		0.080	0.0856	0.0000	*
12547	Sample	0.71	0.132	0.066		0.064	0.0264	0.0000	*
12548	Sample	0.68	0.090	0.008	*	0.110	0.5088	0.0005	*
12549	Sample	0.90	0.021	0.251		0.172	0.3880	0.0966	
12550	Sample	0.88	0.412	0.382		0.134	0.5643	0.0041	*
12551	Sample	0.90	0.016	0.307		0.168	0.0460	0.0170	*

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).

1 If the F-Test result was significant (relative to thte Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

Hyalella azteca
Acute Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3615a
Aquatec Biological Sciences

			Day 10 Data							
Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12552	A	10	6	0.6		28.52	30.36	6	0.307	
	B	10	9	0.9		30.76	31.84	9	0.120	
	C	10	10	1		31.62	33.73	10	0.211	
	D	10	9	0.9		27.67	29.76	9	0.232	
	E	10	8	0.8		29.39	31.17	8	0.223	
	F	10	9	0.9		29.56	32.15	9	0.288	
	G	10	9	0.9		29.61	31.76	9	0.239	
	H	10	9	0.90	0.86	21.96	23.43	9	0.163	0.223
12546	A	10	9	0.90		29.35	29.70	9	0.039	
	B	10	9	0.90		33.28	34.17	9	0.099	
	C	10	9	0.90		31.89	32.49	9	0.067	
	D	10	9	0.90				*	*	
	E	10	10	1.00		30.55	31.55	10	0.100	
	F	10	10	1.00		29.54	30.13	10	0.059	
	G	10	7	0.70		31.04	31.90	7	0.123	
	H	10	9	0.90	0.90	36.72	37.41	9	0.077	0.080
12547	A	10	6	0.60		27.76	27.98	6	0.037	
	B	10	10	1.00		30.95	31.60	10	0.065	
	C	10	7	0.70		33.31	33.71	7	0.057	
	D	10	8	0.80		31.58	32.21	8	0.079	
	E	10	7	0.70		31.94	32.53	7	0.084	
	F	10	9	0.90		33.35	34.11	9	0.084	
	G	10	8	0.80		25.95	26.62	8	0.084	
	H	10	2	0.20	0.71	33.87	34.29	2	0.021	0.064
12548	A	10	8	0.80		30.15	30.87	8	0.090	
	B	10	6	0.60		29.31	30.55	6	0.207	
	C	10	6	0.60		31.25	31.55	6	0.050	
	D	10	6	0.60		30.00	30.78	6	0.130	
	E	10	7	0.70		29.78	30.30	7	0.074	
	F	10	6	0.60		31.74	32.32	6	0.097	
	G	10	8	0.80		30.16	31.04	8	0.110	
	H	10	7	0.70	0.68	24.43	25.29	7	0.123	0.110
12549	A	10	10	1.00		31.68	33.23	10	0.155	
	B	10	8	0.80		26.02	26.64	8	0.078	
	C	10	10	1.00		27.87	29.33	10	0.146	
	D	10	8	0.80		32.54	33.43	8	0.111	
	E	10	8	0.80		28.32	29.87	8	0.194	
	F	10	9	0.90		25.55	26.76	8	0.151	
	G	10	10	1.00		31.47	32.56	3	0.363	
	H	10	9	0.90	0.90	28.89	30.50	9	0.179	0.172
12550	A	10	9	0.90		27.87	28.57	9	0.076	
	B	10	10	1.00		25.64	26.40	9	0.084	
	C	10	9	0.90				*	*	
	D	10	5	0.50		29.10	30.10	5	0.200	
	F	10	10	1.00		33.56	34.67	10	0.109	
	G	10	9	0.90		23.84	24.96	9	0.124	
	H	11	11	1.00	0.88	23.93	25.89	11	0.178	0.134
12551	A	10	9	0.90		28.94	30.32	9	0.153	
	B	10	10	1.00		32.79	34.17	10	0.138	
	C	10	8	0.80		34.40	35.91	8	0.189	
	D	10	10	1.00		27.15	28.98	10	0.183	
	E	10	9	0.90		33.25	34.79	9	0.171	
	F	10	9	0.90		32.88	34.80	9	0.213	
	G	10	7	0.70		27.47	28.58	7	0.159	
	H	10	10	1.00	0.90	25.40	26.75	10	0.135	0.168

* *No organisms weighed, see Protocol Deviations.*

Summary of Statistical Tests and Probabilities
Dead Creek *Hyalella azteca* Acute Toxicity Test
BTR: 3615b

Day 10		Survival: Proportion Surviving	Survival: F-Test Equal Variance[1]	Survival: T-Test Statistical Probability	Survival: Statistically Significant	Growth: Average Weight (mg)	Growth: F-Test Equal Variance[1]	Growth: T-Test Statistical Probability	Growth: Statistically Significant
12552	Control	0.86				0.223			
12589	Sample	0.16	0.184	0.000	*	0.937	0.0000	0.0199	
12590	Sample	0.19	0.044	0.000	*	0.550	0.0000	0.1467	
12591	Sample	0.01	0.530	0.000	*	0.000	NA[2]	NA[2]	*
12592	Sample	0.64	0.055	0.005	*	0.411	0.0087	0.0122	
12593	Sample	0.10	0.325	0.000	*	1.372	0.0000	0.0339	
12609	Sample	0.23	0.269	0.000	*	2.136	0.0000	0.0029	
12610	Sample	0.76	0.233	0.135		0.664	0.0138	0.0000	

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$).

1. If the F-Test result was significant (relative to the Laboratory Control, $P<0.05$), the T-Test was performed using unequal variances.
2. There was not enough sample and/or control response variability to conduct a meaningful F-Test.

Hyalella azteca
Acute Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3615b
Aquatec Biological Sciences

			Day 10 Data							
Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12552	A	10	6	0.60		28 52	30 36	6	0 307	
	B	10	9	0.90		30 76	31 84	9	0 120	
	C	10	10	1.00		31 62	33 73	10	0.211	
	D	10	9	0 90		27 67	29 76	9	0.232	
	E	10	8	0.80		29.39	31.17	8	0.223	
	F	10	9	0 90		29.56	32.15	9	0.288	
	G	10	9	0.90		29 61	31.76	9	0.239	
	H	10	9	0.90	0.86	21 96	23.43	9	0.163	0 223
12589	A	10	0	0.00				0	0.000	
	B	10	1	0 10		27 32	28.90	1	1.580	
	C	10	2	0.20		25.27	27.00	1	1.730	
	D	10	0	0.00				0	0 000	
	E	10	1	0.10		27 39	29.27	1	1.880	
	F	10	2	0.20		30 30	33 22	2	1.460	
	G	10	2	0.20		27 29	28.29	2	0 500	
	H	10	5	0.50	0.16	31.89	33.28	4	0.348	0.937
12590	A	10	1	0 10		34 53	36.46	1	1.930	
	B	10	0	0.00				0	0 000	
	C	10	5	0 50		33.17	35 83	5	0.532	
	D	10	6	0 60				*	*	
	E	10	2	0.20		32 63	35 25	2	1.210	
	F	10	0	0.00				0	0 000	
	G	10	1	0 10		35.04	35.40	2	0 180	
	H	10	0	0 00	0.19			0	0.000	0.550
12591	A	10	0	0.00				0	0.000	
	B	10	0	0.00				0	0 000	
	C	10	0	0.00				0	0 000	
	D	10	0	0.00				0	0 000	
	E	10	0	0.00				0	0.000	
	F	10	0	0.00				0	0.000	
	G	10	1	0.10				0	0 000	
	H	10	0	0.00	0 01			0	0 000	0.000
12592	A	10	8	0.80		30.25	33 04	8	0 349	
	B	10	4	0 40		32 94	34.30	3	0 453	
	C	10	8	0 80		28.43	30.67	8	0 280	
	D	10	8	0 80		33.73	37.12	8	0.424	
	E	10	8	0 80		30.41	32.06	7	0.236	
	F	10	5	0.50		38 87	40.21	5	0.268	
	G	10	3	0.30		25.29	26 69	3	0.467	
	H	10	7	0.70	0.64	33.5	39.21	7	0.816	0.411
12593	A	10	1	0.10		26 82	29.00	1	2.180	
	B	10	2	0.20		31.37	33.69	2	1.160	
	C	10	0	0.00				0	0.000	
	D	10	0	0.00				0	0.000	
	F	10	1	0.10		22.90	26.11	1	3.210	
	G	10	0	0.00				0	0 000	
	H	10	1	0.10	0 10	25 36	29 11	1	3.750	1.372
12609	A	10	1	0 10		37 16	40 82	1	3 660	
	B	10	1	0 10		33 61	37 05	1	3 440	
	C	10	1	0.10		38 62	42.83	1	4 010	
	D	10	6	0 60		36 43	40 24	6	0 635	
	E	10	2	0.20		26 59	29.70	3	1 037	
	F	10	2	0.20		26 53	29 12	2	1 295	
	G	10	4	0 40		32 31	35 65	4	0 835	
	H	10	1	0.10	0 23	32 77	34 95	1	2 180	2 136
12610	A	10	6	0 60		25 00	28.96	6	0 663	
	B	10	8	0.80		29 95	35.42	8	0 684	
	C	10	8	0.80		26 78	32 93	8	0 769	
	D	10	10	1 00		32 53	36 55	10	0 402	
	E	10	10	1.00		30 09	34 73	10	0 464	
	F	10	7	0 70		25 59	29.73	6	0.690	
	G	10	8	0 80		27 03	31 83	7	0.686	
	H	10	4	0.40	0 76	34 39	38 21	4	0 955	0 664

* No organisms weighed, see Protocol Deviations

Summary of Statistical Tests and Probabilities
Dead Creek *Hyalella azteca* Acute Toxicity Test
BTR: 3633a

		Survival				Growth			
Day 10		Proportion Surviving	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant	Average Weight (mg)	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant
12622	Control	0.86				0.202			
12611	Sample	0.85	0.653	0.402		0.141	0.620	0.001	*
12612	Sample	0.89	0.105	0.376		0.156	0.701	0.007	*
12613	Sample	0.94	0.043	0.462		0.154	0.894	0.009	*
12614	Sample	0.91	0.037	0.436		0.154	0.851	0.006	*

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).

1. If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances

Sample Number	Replicate	Start Count	Day 10 Data: # Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12622	A	10	7	0.70		35.9	37.45	7	0.221	
	B	10	10	1.00		33.92	35.55	10	0.163	
	C	10	8	0.80		33.32	34.81	8	0.186	
	D	10	9	0.90		35.54	37.78	9	0.249	
	E	10	10	1.00		36.47	38.59	10	0.212	
	F	10	10	1.00		32.63	34.74	10	0.211	
	G	10	8	0.80		34.83	35.85	7	0.146	
	H	10	7	0.70	0.86	38.00	39.57	7	0.224	0.202
12611	A	10	6	0.60		34.69	35.59	6	0.150	
	B	10	8	0.80				*	*	
	C	10	9	0.90		35.63	36.65	9	0.113	
	D	10	8	0.80		39.05	40.29	8	0.155	
	E	10	9	0.90		33.19	34.90	9	0.190	
	F	10	10	1.00		36.59	37.69	10	0.110	
	G	10	9	0.90		39.11	40.26	9	0.128	
	H	10	9	0.90	0.85	35.08	36.37	9	0.143	0.141
12612	A	10	8	0.80		38.55	39.66	8	0.139	
	B	10	9	0.90		35.51	36.77	9	0.140	
	C	10	10	1.00		35.22	36.80	10	0.158	
	D	10	8	0.80		35.08	36.51	8	0.179	
	E	10	9	0.90		34.78	35.87	9	0.121	
	F	10	9	0.90		34.36	35.98	9	0.180	
	G	10	9	0.90		41.04	42.20	9	0.129	
	H	10	9	0.90	0.89	45.19	47.04	9	0.206	0.156
12613	A	10	10	1.00		40.36	41.89	10	0.153	
	B	10	9	0.90		39.26	40.33	9	0.119	
	C	10	10	1.00		33.68	34.99	10	0.131	
	D	10	8	0.80		41.33	42.35	8	0.128	
	E	10	10	1.00		41.45	42.84	10	0.139	
	F	10	10	1.00		40.34	41.91	10	0.157	
	G	10	9	0.90		42.22	44.29	9	0.230	
	H	10	9	0.90	0.94	40.51	42.12	9	0.179	0.154
12614	A	10	10	1.00		38.64	39.76	10	0.112	
	B	10	9	0.90		38.95	40.19	9	0.138	
	C	10	7	0.70		37.28	38.23	7	0.136	
	D	10	10	1.00		35.81	37.18	10	0.137	
	E	10	10	1.00		37.76	39.92	10	0.216	
	F	10	10	1.00		41.40	42.92	10	0.152	
	G	10	7	0.70		41.23	42.46	7	0.176	
	H	10	10	1.00	0.91	40.04	41.68	10	0.164	0.154

*No organisms weighed, see Protocol Deviations.

Summary of Statistical Tests and Probabilities
Dead Creek *Hyalella azteca* Acute Toxicity Test
BTR: 3633b

Day 10		Survival				Growth			
		Proportion Surviving	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant	Average Weight (mg)	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant
12622	Control	0.86				0.202			
12638	Sample	0.96	0.054	0.036		0.172	0.434	0.085	
12639	Sample	0.91	0.349	0.216		0.221	0.885	0.140	
12640	Sample	0.86	0.051	0.233		0.219	0.741	0.144	
12641	Sample	0.83	0.043	0.154		0.183	0.213	0.217	

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, p<0.05).

1 If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

Hyalella azteca
Acute Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3633b
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
			Day 10 Data							
12622	A	10	7	0.70		35.9	37.45	7	0.221	
	B	10	10	1.00		33.92	35.55	10	0.163	
	C	10	8	0.80		33.32	34.81	8	0.186	
	D	10	9	0.90		35.54	37.78	9	0.249	
	E	10	10	1.00		36.47	38.59	10	0.212	
	F	10	10	1.00		32.63	34.74	10	0.211	
	G	10	8	0.80		34.83	35.85	7	0.146	
	H	10	7	0.70	0.86	38.00	39.57	7	0.224	0.202
12638	A	10	10	1.00		36.21	37.61	10	0.140	
	B	10	10	1.00		32.14	33.57	10	0.143	
	C	10	9	0.90		37.76	38.77	9	0.112	
	D	10	10	1.00		40.64	42.43	10	0.179	
	E	10	9	0.90		35.52	36.71	9	0.132	
	F	10	10	1.00		31.14	33.25	10	0.211	
	G	10	10	1.00		35.66	38.00	10	0.234	
	H	10	9	0.90	0.96	37.52	39.54	9	0.224	0.172
12639	A	10	9	0.90		34.44	35.79	9	0.150	
	B	10	10	1.00		36.84	38.81	10	0.197	
	C	10	8	0.80		34.06	36.20	8	0.266	
	D	10	9	0.90		27.24	29.41	9	0.241	
	E	10	10	1.00		28.68	31.15	10	0.247	
	F	10	8	0.80		34.61	36.40	8	0.224	
	G	10	9	0.90		37.94	40.05	9	0.234	
	H	10	10	1.00	0.91	37.24	39.34	10	0.210	0.221
12640	A	10	8	0.80		27.90	29.53	8	0.204	
	B	10	6	0.60		23.40	25.14	6	0.290	
	C	10	9	0.90		37.66	39.44	9	0.198	
	D	10	8	0.80		25.06	26.72	8	0.208	
	E	10	10	1.00		28.45	30.63	10	0.218	
	F	10	9	0.90		31.90	33.71	9	0.201	
	G	10	10	1.00		34.54	36.64	10	0.210	
	H	10	9	0.90	0.86	33.49	35.53	9	0.227	0.219
12641	A	10	8	0.80		30.74	31.70	8	0.120	
	B	10	10	1.00		30.83	32.75	10	0.192	
	C	10	9	0.90		31.24	32.49	9	0.139	
	D	12	12	1.00		33.61	35.62	12	0.168	
	E	10	9	0.90		34.36	36.17	9	0.201	
	F	10	7	0.70		26.92	28.19	7	0.181	
	G	10	4	0.40		36.63	37.85	4	0.305	
	H	10	9	0.90	0.83	39.97	41.38	9	0.157	0.183

Summary of Statistical Tests and Probabilities
Dead Creek *Hyalella azteca* Acute Toxicity Test
BTR: 3461

Day 10		Survival: Proportion Surviving	Survival: F-Test Equal Variance	Survival: T-Test Statistical Probability	Survival: Statistically Significant	Growth: Average Weight (mg)	Growth: F-Test Equal Variance	Growth: T-Test Statistical Probability	Growth: Statistically Significant
12668	Control	0.98				0.268			
12664	Sample	0.98	1.000	0.500		0.254	0.547	0.261	
12665	Sample	0.98	1.000	0.500		0.404	0.601	0.000	
12666	Sample	0.98	1.000	0.500		0.393	0.034	0.002	
12671	Sample	0.98	0.367	0.478		0.335	0.511	0.003	

* A statistically significant reduction in the response was observed (relative to the Laboratory Co[illegible] [illegible] 0.05).

			Day 10 Data							
Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12668	A	10	10	1.00		30.81	33.19	10	0.238	
	B	10	10	1.00		26.79	29.62	10	0.283	
	C	10	10	1.00		29.98	32.17	10	0.219	
	D	10	10	1.00		23.66	26.88	10	0.322	
	E	10	9	0.90		26.13	28.6	9	0.274	
	F	10	10	1.00		29.22	32.29	10	0.307	
	G	10	9	0.90		21.52	23.68	9	0.240	
	H	10	10	1.00	0.98	24.02	26.59	10	0.257	0.268
12664	A	10	10	1.00		39.18	40.98	10	0.180	
	B	10	10	1.00		32.99	35.06	10	0.207	
	C	10	9	0.90		41.23	43.62	9	0.266	
	D	10	10	1.00		36.75	39.51	10	0.276	
	E	10	10	1.00		32.17	35.43	10	0.326	
	F	10	9	0.90		40.12	42.65	9	0.281	
	G	10	10	1.00		36.04	38.49	10	0.245	
	H	10	10	1.00	0.98	35.76	38.29	10	0.253	0.254
12665	A	10	9	0.90		27.97	31.79	9	0.424	
	B	10	10	1.00		29.88	33.46	10	0.358	
	C	10	10	1.00		29.18	32.64	10	0.346	
	D	10	10	1.00		28.55	32.54	10	0.399	
	E	10	10	1.00		29.28	33.98	10	0.470	
	F	10	9	0.90		28.25	32.36	9	0.457	
	G	10	10	1.00		31.97	35.91	10	0.394	
	H	10	10	1.00	0.98	24.38	28.25	10	0.387	0.404
12666	A	10	9	0.90		34.15	37.52	9	0.374	
	B	10	10	1.00		34.11	38.09	10	0.398	
	C	10	10	1.00		35.53	39.32	10	0.379	
	D	10	10	1.00		37.52	41.57	10	0.405	
	E	10	10	1.00		29.66	33.32	10	0.366	
	F	10	10	1.00		32.52	36.79	10	0.427	
	G	10	9	0.90		32.96	37.95	9	0.554	
	H	10	10	1.00	0.98	31.85	34.27	10	0.242	0.393
12671	A	10	10	1.00		25.12	27.91	10	0.279	
	B	10	8	0.80		30.63	33.41	8	0.348	
	C	10	10	1.00		30.06	32.94	10	0.288	
	D	10	10	1.00		33.29	36.48	10	0.319	
	E	10	10	1.00		29.46	32.75	10	0.329	
	F	10	10	1.00		29.84	33.01	10	0.317	
	G	10	10	1.00		32.94	36.73	10	0.379	
	H	10	10	1.00	0.98	32.14	36.32	10	0.418	0.335

Aquatec Biological Sciences

Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE/ PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4°C
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453-4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453-7260			
Contact Name: Ken Cerrelo, Ph.D.	Quote #: 3/99 Client Code: MENCUR	Hand Delivered: ___Yes ___No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX-C-1	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	F=0.4				
BTOX-C-1-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	F=0.4				
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth Merrett	10/4/99	19:00	Karen Downey
Relinquished by: (signature)	10/5/99	10:00	Received by: (signature)
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ____ °C

3 Coolers

Page of

Aquatec Biological Sciences

Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION

Name: Menzie Cura & Associates
Address: One Courthouse Lane, Suite 2
Chelmsford, MA 01824
Telephone: (978) 453-4300
Facsimile: (978) 453-7260
Contact Name: Ken Cerrelo, Ph.D.

COMPANY'S PROJECT INFORMATION

Project Name: Dead Creek Sediment Tox
Project Number: 99033
Sampler Name(s):
Quote #: 3/99
Client Code: MENCUR

SHIPPING INFORMATION

Carrier:
Airbill Number:
Date Shipped:
Hand Delivered: Yes No

VOLUME/CONTAINER TYPE/ PRESERVATIVE

4°C — plastic — 1 gal

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX-C-3-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth; *Hyalella azteca* 42 day Chronic Toxicity; *Chironomus tentans* 10 d Survival & Growth; *Chironomus tentans* Chronic Toxicity	1	T=09				
BTOX-D-3	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth; *Hyalella azteca* 42 day Chronic Toxicity; *Chironomus tentans* 10 d Survival & Growth; *Chironomus tentans* Chronic Toxicity	1	T=0.9				
BTOX-D-3-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth; *Hyalella azteca* 42 day Chronic Toxicity; *Chironomus tentans* 10 d Survival & Growth; *Chironomus tentans* Chronic Toxicity	1	T=0.9				
BTOX-C-2-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth; *Hyalella azteca* 42 day Chronic Toxicity; *Chironomus tentans* 10 d Survival & Growth; *Chironomus tentans* Chronic Toxicity	1	T=0.9				
BTOX-C-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth; *Hyalella azteca* 42 day Chronic Toxicity; *Chironomus tentans* 10 d Survival & Growth; *Chironomus tentans* Chronic Toxicity	1	T=09				

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth V Cerreto	10/4/99	17:00	
Relinquished by: (signature)	DATE	TIME	Received by: (signature)
	10/5/99	10:00	Karen Downey
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery:_____°C

3 Coolers

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

Aquatec Biological Sciences
Chain-of-Custody Record

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE/ PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4°C
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453-4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453-7260			
Contact Name: Ken Cerrelo, Ph.D.	Quote #: 3/99 Client Code: MENCUR	Hand Delivered: ___Yes ___No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX-D-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-D-2-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-D-1	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-D-1-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-C-3	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth M Cerreto	10/4/99	19:00	
	10/5/99	10:00	Karen Downey

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ______°C

3 Coolers

Serial Number 137910

SL ~~SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.~~
Aquatech Colchester, VT

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

[In two (2) coolers]

- 5102 LaRoche Avenue, Savannah, GA 31404 — Phone (912) 354-7858 — Fax (912) 352-0165
- 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone (904) 878-3994 — Fax (904) 878-9504
- 414 SW 12th Avenue, Deerfield Beach, FL 33442 — Phone (954) 421-7400 — Fax (954) 421-2584
- 900 Lakeside Drive, Mobile, AL 36693 — Phone (334) 666-6633 — Fax (334) 666-6696
- 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone (813) 885-7427 — Fax (813) 885-7049
- 100 Alpha Drive, Suite 110, Destrehan, LA 70047 — Phone (504) 764-1100 — Fax (504) 725-1163

PROJECT REFERENCE	PROJECT NO.	P.O. NUMBER
Sauget Area I	648B	

PROJECT LOC. (State)	SAMPLER(S) NAME	PHONE / FAX
IL	C. Menzie, K. Fogarty	978-453-4300 / 978-453-7260

CLIENT NAME: Menzie-Cura / Solutia

CLIENT PROJECT MANAGER: C. Menzie

CLIENT ADDRESS (CITY, STATE, ZIP): 1 Courthouse Lane Suite 2 Chelmsford MA

MATRIX TYPE — REQUIRED ANALYSES: Tox - haz pres; none; Tests are wt. tox (?)

PAGE 1 OF 1

[X] STANDARD REPORT DELIVERY
[ ] EXPEDITED REPORT DELIVERY (surcharge)

Date Due:

DATE	TIME	SL NO.	SAMPLE IDENTIFICATION	MATRIX	NUMBER OF CONTAINERS SUBMITTED	REMARKS
10/5/99	9:45		BTOX - B - 1	X	2	
10/5/99	9:45		BTOX - B - 1 (dupe)	X	2	
10/5/99	14:10		BTOX - B - 2	X	2	
10/5/99	9:00		BTOX - B - 3	X	2	
10/5/99	13:40		BTOX - M	X	2	

Cooler Temp = 1.2°C (large cooler)
Cooler Temp = 0.5°C (small cooler)

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Katherine O. Fogarty	10/5/99	1725						
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Karen Dorsey	10/6/99	10:00						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SL LOG NO.	LABORATORY REMARKS:
			[ ] YES [ ] NO			

ORIGINAL

CHAIN OF CUSTODY RECORD

Project No.	Project Name:	Project Location:
648B	Sauget Area I - Dead Creek	Sauget/Cahokia Ill

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

DATE: 10/6/99

SAMPLERS: C Menzie, K Fogarty

Analyses Required

SAMPLE ID	Date	Comp.	Grab (Time)	Station Locations	No. of Containers	Bioassay (see note ①)					NOTES
E-1	10/6/99	✓	9:50	Dead Creek Sed. E	2	X					
E-2		✓	9:05	↓	2	X					
E-3		✓	12:10		2	X					
BP-1			11:30	Borrow Pit	2	X					
BP1 (Dupe)			11:30	↓	2	X					
BP-3	↓		16:30		2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Kathleen A. Fogarty	10/6/99	1900	Karen Downey	10/7/99	10:00
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Note ① H. azteca/ C. tentans acute/ chronic sediment toxicity tests

Laboratory: Aquatech

Phone:

Contact Person: Phil. Downey

Via Fedex in 3 coolers

Cooler #1 Temp = 3.1°C - B3 + E3
Cooler #2 Temp = 3.2°C - BP1 + BP1-Dup
Cooler #3 Temp = 3.5°C

PAGE 1 OF 1

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Location
6478 B	Dead Creek - Sauget Area 1	Sauget/Cahokia, IL

MENZIE CURA & ASSOCIATES, INC
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

DATE 10/7/99

SAMPLERS C. Menzie, K. Fogarty

Analyses Required

SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	[illegible]					NOTES
SD-2	10/7/99	9:30		Borrow Pit	2	X					C1 C1
" 1	↓	15:00		Dead Creek Sediment	2	X					C2 C2
" 2		16:00		↓ ↓	2	X					C1 C2
" 3	↓	10:45			2	X					C1 C2

Cooler 1 2.3°C
Cooler 2 2.7°C

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine A Fogarty	10/7/99	1800	Phil Downey	10/8/99	10:30
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Sent in 2 coolers via Fedex

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

CHAIN OF CUSTODY RECORD

Project No.	Project Name:	Project Location:	
648B	Dead Creek - Sauget Area I	Sauget-Cahokia, Ill.	MENZIE-CURA & ASSOCIATES, INC. 1 COURTHOUSE LANE, SUITE 2 CHELMSFORD, MA 01824 TEL: 978/453-4300 FAX: 978/453-7260

DATE: 10/8/99

SAMPLERS C. Menzie, K. Fogarty

Analyses Required

SAMPLE ID	Date	Time Comp.	~~Grab~~	Station Locations	No. of Containers	Hazleton: C Tentans w/ culture					NOTES
P.DC-1	10/8/99	9:30		Prairie du Pont Creek	2	X					
P.DC-2	↓	11:20		" " "	2	X					
Ref2-1	↓	16:30		Ref creek	2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine A Fogarty	10/8/99	15:30			
Relinquished By: (Signature)	Date 10/9/99	Time 10:30	Received By: (Signature) J. Galbraith	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks:
2 coolers via Fedex
Shipping bill No.
811399409571

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

Cooler Temp #1 1°C
#2 3.1°C

PAGE 1 OF 1

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CHAIN OF CUSTODY RECORD

Project No	Project Name	Project Location:
6481B	Dead Creek Sauget Area I	Sauget / Cahokia, Ill.

MENZIE CURA & ASSOCIATES, INC
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453 4300 FAX: 978/453-7260

DATE: 10/9/99

SAMPLERS: C. Menzie, K. Fozarte

Analyses Required

	SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	[illegible]					NOTES
[illegible]	RefA-2	10/9/99	10:30	✓	Reference Borrow Pit	2	✓					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fozarte	10/9/99	12:30			
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Sent via US Air Counter to Counter

Laboratory: Aquatech

Contact Person: Phil Downey

Phone:

8100[illegible]

PAGE 1 OF 1

APPENDIX: C

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: October 19, 1999	Test End: October 29, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.	
12546	A	9 ~~6~~	~~J~~ JG	—	—	9	9	29.35	29.70	
	B	9	J	—	—	9	9	33.28	34.17	
	C	9	RB	—	—	9	9	31.89	32.49	
	D	9	TM	—	—	9	0	31.93	—	No Amphipods in vial. 11/14
	E	10	J	—	—	10	10	30.55	31.55	
	F	10	JG	—	—	10	10	29.54	30.13	
	G	7	J	0	TM 11/14	7	7	31.04	31.90	
	H	9	J	—	—	9	9	36.72	37.41	
12547	A	6	J	0	TM 11/11	6	6	27.76	27.98	
	B	10	J	—	—	10	10	30.95	31.60	
	C	7	TM	0	TM 11/[illegible]	7	7	33.31	33.71	
	D	8	TM	0	TM 11/14	8	8	31.58	32.21	
	E	6	J	1	TM 11/11	7	7	31.94	32.53	
	F	9	J	—	—	9	9	33.35	34.11	
	G	8	RB	0	TM 11/[illegible]	8	8	25.95	26.62	
	H ②	2	JG	—	—	2	2	33.87	34.29	
12548	A	8	RB	0	11/[illegible] TM	8	8	30.15	30.87	
	B	3	JG	3	[illegible] TM	6	6	29.31	30.55	
	C	6	JG	—	—	6	6	31.25	31.55	
	D	5	JG	1	J 11/14 TM	6	6	30.00	30.78	
this 3 dead	E	7	TM	0	JG 11/9	7	7	29.78	30.30	
	F	6	TM	0	TM 11/11	6	6	31.74	32.32	
	G	8	JG	—	—	8	8	30.16	31.04	
this 2 dead	H	7	TM	—	—	7	7	24.43	25.29	
12549	A	10	J	—	—	10	10	31.68	33.23	
	B	8	JG	—	—	8	8	26.02	26.64	
	C	10	JG	—	—	10	10	27.87	29.33	
	D	8	TM	0	JG 11/7	8	9	32.54	33.43	
	E	8	JG	—	—	8	8	28.32	29.87	
	F	8	TM	1	TM 11/11	9	8	*25.55	26.76	
	G	10	JG	—	—	10	~~10~~ 3①	31.47	32.56	
	H	9	J	0	TM 11/11	9	9	28.89	30.50	

Balance QC Initial (20 mg = 19.47) Final (20 mg = 19.97) Balance Asset #:

Date/time In 11/14 [illegible] Temp(°C) 79° Init. JG Date/time out 11/15 [illegible] Temp(°C) 79°C Init. TM

Comments: * ① One [illegible] nymph (orianata) present. 10/29 JG

① * Only 3 amphipods in vial. Correction 11/14. JG

Reviewer J Date 12/3/99

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Laboratory Aquatec Biological Sciences South Burlington, Vermont

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: October 19, 1999	Test End: October 29, 1999

Sample	Repl.	# Alive	10/29/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12550	A	9	TM	—	—	9	9	27.87	28.57
	B	10	J	—	—	10	9 Lost one J	25.64	26.40
	C	9	TM	—	—	9	0	27.50	—
Chironomids present	D	5	TM	0	JG 11/7	5	5	29.10	30.10
	E	8	JG	—	—	8	8	28.55	29.86
	F	10	JG	—	—	10	10	33.58	34.67
	G	9	J	—	—	9	9	23.84	24.96
	H	11	J	—	—	11	11	23.93	25.89
12551	A	9	JG	—	—	9	9	28.94	30.32
	B	10	J	—	—	10	10	32.79	34.17
	C	8	TM	0	JG 11/7	8	8	34.40	35.91
	D	10	JG	—	—	10	10	27.15	28.98
	E	9	J	—	—	9	9	33.25	34.79
	F	9	JG	—	—	9	9	32.88	34.80
	G	7	JG	—	—	7	7	27.47	28.58
	H	10	JG	—	—	10	10	25.40	26.75
12552	A	6	J	0	JG 11/7	6	6	28.52	30.36
	B	9	JG	—	—	9	9	30.76	31.84
	C	10	J	—	—	10	10	31.62	33.73
	D	9	J	—	—	9	9	27.67	29.76
	E	8	J	0	JG 11/12	8	8	29.39	31.17
	F	9	TM	—	—	9	9	29.56	32.15
	G	9	JG	—	—	9	9	29.61	31.76
	H	9	J	—	—	9	9	21.96	23.43
12589	A	0	LS	—	—	0	—	~~25.38~~	—
	B	1	JG	—	—	1	1	27.32	28.90
	C	2	JG	—	—	2	1	25.27	27.00
	D	0	LS	0	JG 11/7	0	—	27.66	—
	E	1	J	0	JG 11/9	1	1	27.39	29.27
	F	2	LS	0	JG 11/7	2	2	30.30	33.22
	G	1	RB	0 TM J 10/29	TM 11/11	2	2	27.29	28.29
	H	5	TM	0	TM 11/14	5	4	31.89	33.28

11/9/99 Broke down Rep I from chronic test

I = 3 survivor 11/9/99 JG (chronic test)

Balance QC: Initial (20 mg = 19.94 KRD)	Final (20 mg = 19.94 KRD)	Balance Asset #:		
Date/time In 11/19/99 1730	Temp(°C) 80°	Init. KRD	Date/time out 11/20 17:00 Temp(°C) 82	Init. JG
Comments:				

Reviewer: J Date: 12/3/99

000020

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: October 19, 1999	Test End: October 29, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12590	A	1	J	0	TM 11/11	1	1	34.53	36.46
predator	B*	0	RB	0	JG 11/7	0	—	34.6?	—
predator / macroinvertebrate	C	5	TM	0	TM 11/11	5	5	33.17	35.83
	D	6	LS	0	JG 11/12	~~0~~ 6	—	37.06	—
	E	1	RB	1	TM 11/11	2	2	32.83	35.25
	F	0	JG	—	—	0	—	40.78	—
	G	1	LS	0	TM 11/11	1	2	35.04	35.40
	H	0	J	0	JG 11/9	0	—	26.30	—
12591	A	0	JG	—	—	0	—	21.31	—
No indigenous organisms present	B	0	J	0	TM 11/4	0	—	23.93	—
	C	0	LS	—	—	0	—	22.43	—
	D	0	J	—	—	0	—	22.19	—
	E	0	LS	—	—	0	—	19.98	—
	F	0	J	—	—	0	—	19.34	—
	G	1	JG	—	—	1 ①	—	20.45	—
	H	0	J	—	—	0	—	23.32	—
12592	A	8	J	0	JG 11/7	8	8	30.25	33.04
	B	4	JG	—	—	4	3	32.94	34.30
	C	8	J	0	JG 11/9	8	8	28.43	30.67
	D	8	J	0	JG 11/7	8	8	33.73	37.12
	E	8	JG	—	—	8	7	30.41	32.06
	F	5	LS	—	—	5	5	38.87	40.21
	G	3	JG	—	—	3	3	25.29	26.69
	H	7	TM	0	JG 11/9	7	7	33.50	29.21
12593	A	1	JG	—	—	1	1	26.82	29.00
No indigenous organisms present	B	2	J	—	—	2	2	31.37	33.69
	C	0	LS	—	—	0	—	27.48	—
	D	0	JG	—	—	0	—	26.17	—
	E	3	LS	—	—	3	3	29.14	31.17
	F 1 dead	1	JG	—	—	1	1	22.90	26.11
	G 4 dead	0	JG	—	—	0	—	26.46	—
	H	1	J	Carefully sieved		1	1	25.36	29.11

Broke down Reps KFDL, found no surviving H. azteca, Terminated Chronic test 11/4/99 TM

593 L broken down 11/4/99 8 survivors and 1 dead orga found 11/4/99 TM

KRD

Balance QC	Initial (20 mg = 19.94)	Final (20 mg = 19.95)	Balance Asset #:
Date/time In 11/19/99	Temp(°C) 21°	Init. KRD	Date/time out	Temp(°C)	Init.
Comments:			

① Lost during transfer to weigh pan. 11/11 JG

Reviewer J Date 12/3/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000021

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: October 19, 1999	Test End: October 29, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12609 *	A	1	J	0	TM 11/14	1	1	37.16	40.82
	B	1	RB	0	JG 11/7	1	1	33.61	37.05
	C	0	JG	1	TM 11/14	1	1	38.82	42.83
*	D	~~5~~ 6 JG	JG	—	—	JG ~~5~~ 6	6	36.43	40.24
	E	2	LS	0	JG 11/7	2	3	26.59	29.70
	F	2	J	0	TM 11/14	2	2	26.53	29.12
	G	4	LS	0	JG 11/7	4	4	32.31	35.6~~4~~5 JG
	H	1	JG	—	—	1	1	32.77	34.95
12610	A	6	JG	—	—	6	6	25.00	28.98
	B	8	RB	—	—	8	8	29.95	35.42
	C	8	RB	—	—	8	8	26.78	32.93
	D	10	LS	—	—	10	10	32.53	36.55
	E	10	J	—	—	10	10	30.09	34.73
	F	7	RB	0	TM 11/14	7	6	25.59	29.73
	G	8	J	0	JG 11/7	8	7	27.03	31.83
	H	3	J	1	JG 11/8	4	4	34.39	38.21
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

000022

KRD

Balance QC: Initial (20 mg = 19.95)	Final (20 mg = 19.95)	Balance Asset #:
Date/time In 11/19/99 17:35 Temp(°C) 80° Init. KRD	Date/time out	Temp(°C) Init.
Comments:		

Reviewer: J Date: 12/3/99

* 12609 - Sample DO's very low; 609D has very little overlying water. Sediment expanded during testing. 10/29 JG
Portion of sediment floating. Filamentous algae

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Hyalella azteca Acute
Initial Weight Results
10/19/99

Menzie Cura
Dead Creek
99033

BTR s 3615, 3622, 3629
Aquatec Biological Sciences

Initial Dry Weight Data					
Replicate	# Weighed	Initial Boat Weight (mg)	Final Dry Weight (mg)	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
1	10	39.02	40.45	0.143	
2	10	40.11	41.6	0.149	
3	10	38.73	40.19	0.146	
4	10	41.98	43.41	0.143	
5	10	41.09	42.75	0.166	
6	10	35.32	36.81	0.149	
7	10	40.47	41.86	0.139	
8	10	35.92	37.64	0.172	0.151

Hyalella azteca Initial Dry Wt. (Pre-test)

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3615/ 3629 / 3622 October 19, 1999
Culture ID: 10/19	Age: 9 days	

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)	Avg Dry Wt. (mg)
1	10	39.017	40.45	0.143
2	10	40.110	41.60	0.149
3	10	38.733	40.18	0.146
4	10	~~41.982~~ 41.978	43.41	0.143
5	10	41.086	42.75	0.166
6	10	35.324	36.81	0.149
7	10	40.468	41.86	0.139
8	10	35.917	37.64	0.172
Initials:				
Date:				

Balance QC: Initial (20 mg = 19.96) Final (20 mg = 19.96) Balance Asset #:
Date/time In 12/4 10:40 Temp(°C) 82°C Init. JS Date/time out 12/5 12:00 Temp(°C) 80 Init. JG
Comments:

Subset of amphipods used for acute test starts on 10/19/99.

Reviewer: [signature] Date: 12/8/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000223

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared ______ Field collected ______

Hatch date 10/9-10/99 Receipt date ______

Lot number 100999HA Strain ARO

Brood Origination US FWS MO

II. Water Quality

Temperature 24 °C Salinity — ppt DO 7.6

pH 7.4 Hardness ≈180 ppm

III. Culture Conditions

System: FW static renewal

Diet: Flake Food ✓ Phytoplankton ______ Trout Chow ✓

Brine Shrimp ______ Rotifers ______ Other ______

Prophylactic Treatments: ______

Comments: ______

[illegible] 17.1 °C [illegible]

IV. Shipping Information

SRT on 10/23/99

Client: AQUARCH # of Organisms: 2500

Carrier: Fed Ex Date Shipped: 10/18/99

Biologist: [signature]

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650 [illegible]

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Starts 10/19/99

		Day of Analysis										
Sample	**Parameter**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
12546	T (ºC) *	23.1	27.5	22.5	22.9 / 22.7	21.9 / 22.2	22.5 / 22.1	21.7 / 21.5	22.4 / 22.0	22.6 / 22.3	21.7 / 21.8	22.9
	pH	7.8	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	7.2	6.4	6.8	6.0	7.2	7.0	7.3	6.8	6.5	6.2	6.1
	Conductivity	450	X	X	X	~~X~~ JM	~~X~~ 290	X	X	X	X	310
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12547	T (ºC)	23.2	22.2	22.2	23.2 / 22.5		~~7~~ JM					22.7
	pH	7.6	X	X	X	X	7.6	X	X	X	X	7.4
	DO (mg/L)	6.5	5.3	5.4	5.6	6.3	6.4	5.8	5.4	5.5	5.1	5.2
	Conductivity	430	X	X	X	X	300	X	X	X	X	315
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12548	T (ºC)	23.4	22.2	22.3								21.9
	pH	7.7	X	X	X	X	7.6	X	X	X	X	7.5
	DO (mg/L)	6.2	5.7	6.0	5.2	6.7	7.0	7.0	5.8	5.9	5.2	5.5
	Conductivity	400	X	X	X	X	280	X	X	X	X	310
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/19 TM	10/20 SC	10/21	10/22 JM	10/23	10/24 JM	10/25	10/26	10/27 JM	10/28 JM	10/29 JM

* Temperature measurement reflects measurement from two representative

Comments: test beakers w/in test array (two locations) on

Review: [illegible] Date: 12/3/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000026

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Starts 10/19/99

		Day of Analysis										
Sample	**Parameter**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
12549	T (°C)	23.2	22.1	22.4								21.9
	pH	7.8	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	6.8	6.3	6.8	6.5	7.3	7.1	7.8	6.3	5.9	6.5	6.2
	Conductivity	390	X	X	X	X	~~X~~ 270	X	X	X	X	300
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	~~30~~ ✓
12550	T (°C)	22.3	22.0	22.4								21.9
	pH	7.9	X	X	X	X	7.7	X	X	X	X	7.5
	DO (mg/L)	7.3	6.6	6.5	6.7	7.3	7.3	7.7	6.3	5.7	6.2	5.8
	Conductivity	380	X	X	X	X	280	X	X	X	X	300
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12551	T (°C)	22.7	22.2	22.4								21.8
	pH	7.9	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	6.4	6.8	6.8	6.3	7.3	7.2	7.2	5.9	5.8	6.1	5.6
	Conductivity	380	X	X	X	X	270	X	X	X	X	300
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/19 JM	10/20 [illegible]	10/21 JG	10/22 JM	10/23 JG	10/24 JM	10/25 JM	10/26 JG	10/27 JG	10/28 JM	10/29 JM

Comments:

Review: J Date: 12/3/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000227

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Starts 10/19/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12552	T (°C)	22.0	22.7	22.5								21.9
	pH	7.6	X	X	X	X	7.8	X	X	X	X	7.8
	DO (mg/L)	8.7	7.9	7.4	7.7	7.5	7.5	7.9	7.1	6.7	7.0	7.0
	Conductivity	420	X	X	X	X	~~X~~ 310	X	X	X	X	300
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12589	T (°C)	22.9	22.9	22.5	23.2 / 22.5	22.5 / 22.4	22.4 / 22.5	22.7 / 21.9	22.2 / 22.4	22.6 / 22.4	22.9 / 22.5	22.4
	pH	7.8	X	X	X	X	7.7	X	X	X	X	7.7
	DO (mg/L)	7.0 ~~6.5~~	6.6	6.4	6.2	7.3	7.0	7.4	6.6	6.3	6.3	6.2
	Conductivity	400	X	X	X	X	290	X	X	X	X	310
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12590	T (°C)	21.9	23.1	22.8								22.5
	pH	7.8	X	X	X	X	7.7	X	X	X	X	7.7
	DO (mg/L)	6.5	6.8	6.4	7.0	7.3	7.0	6.9	6.4	6.2	6.7	6.1
	Conductivity	400	X	X	X	X	300	X	X	X	X	320
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/19	10/20	10/21 JG	10/22 JM	10/23 JG	10/24 JG	10/25 JM	10/26 JG	10/27 JG	10/28 JM	10/29 JM

Comments:

Review: ____ Date: 12/3/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Starts 10/19/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12591	T (°C)	21.6	21.9	22.9								22.7
	pH	7.7	X	X	X	X	7.6	X	X	X	X	7.6
	DO (mg/L)	7.8	7.6	7.2	8.0	7.8	7.6	7.8	7.2	7.0	7.0	7.0
	Conductivity	375	X	X	X	X	~~X~~ 290	X	X	X	X	310
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12592	T (°C)	22.3	22.7	22.8								22.8
	pH	7.9	X	X	X	X	7.8	X	X	X	X	7.7
	DO (mg/L)	7.4	6.6	6.4	7.2	7.3	7.0	7.5	6.5	6.2	6.7	6.0
	Conductivity	370	X	X	X	X	310	X	X	X	X	290
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12593	T (°C)	22.2	22.6	22.7								22.9
	pH	7.8	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	7.1	6.1	6.1	7.0	7.4	6.9	7.4	6.6	6.3	6.0	6.1
	Conductivity	375	X	X	X	X	300	X	X	X	X	290
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29

Comments:

Review: ______ Date: 12/3/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000029

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Starts 10/19/99

Sample	Parameter	Day 0	1	2	3	4	5	6	7	8	9	10
12609	T (°C)	21.7	22.4	22.5								22.7
	pH	7.7	X	X	X	X	7.7	X	X	X	X	7.5
	DO (mg/L)	6.6	5.7	5.2	6.0	7.0	6.8	7.2	6.5	6.0	5.1	5.3 (1)
	Conductivity	395	X	X	X	X	~~X~~ 290	X	X	X	X	340
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	
12610	T (°C)	22.0	22.6	22.6								22.6
	pH	7.9	X	X	X	X	7.7	X	X	X	X	7.8
	DO (mg/L)	7.8	6.7	6.3	6.7	7.2	6.7	7.1	6.3	6.3	6.3	6.6
	Conductivity	415	X	X	X	X	310	X	X	X	X	320
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	
~~126[illegible]~~	T (°C)		22.7									
	pH		X	X	X	X		X	X	X	X	
	DO (mg/L)		8.2									
	Conductivity		X	X	X	X		X	X	X	X	
	Ammonia, alk/hardness		X	X	X	X	X	X	X	X	X	
	Init./Date (1999):	10/19	10/20	10/21 JG	10/22 JM	10/23 JG	10/24 JM	10/25 JM	10/26 JG	10/27	10/28 JM	10/29

Comments: (1) 10/29 609 D sediment on top / water / sediment stratification (DO of middle layer = 2.0) ccd

Review: ______ Date: 12/3/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000030

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3633
	Test Start: October 21, 1999	Test End: October 31, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12611	A	6	TM	0	TM 11/14	6	6	34.69	35.59
	B	8	TM	0	TM 11/14	~~6~~ 8	Accidently	discarded	TM
	C	9	JG	—	—	9	9	35.63	36.65
	D	6	JG	1 ~~TM~~	6 TM 11/14	8	8	39.05	40.29
	E	9	TM	—	—	9	9	33.19	34.90
	F	10	TM	—	—	10	10	36.59	37.69
	G	9	J	—	—	9	9	39.11	40.26
	H	9	J	—	—	9	9	35.08	36.37
12612	A	8	JG	—	—	8	8	38.55	39.66
	B	7	J	2	J	~~7~~ 9	9	35.51	36.77
	C	10	TM	—	—	10	10	35.22	36.80
	D	8	JG	—	—	8	8	35.08	36.51
	E	9	TM	—	—	9	9	34.78	35.87
	F	9	TM	—	—	9	9	34.36	35.98
	G	9	JG	—	—	9	9	JG 41.04	42.20
	H	9 ~~10~~ TM	~~JG~~ TM	—	—	9 ~~10~~ TM	9	45.19	47.04
12613	A	10	JG	—	—	10	10	40.36	41.89
	B	9	J	—	—	9	9	39.26	40.33
	C	10	TM	—	—	10	10	33.68	34.99
	D	8	TM	0	TM 11/14	8	8	41.33	42.35
	E	10	TM	—	—	~~7~~ 10	10	41.45	42.84
	F	10	JG	—	—	10	10	40.34	41.91
	G	9	TM	—	—	9	9	42.22	44.29
	H	~~10~~ 9 JG	JG	—	—	9	9	40.51	42.12
12614	A	10	J	—	—	10	10	38.64	39.76
	B	9	J	—	—	9	9	38.95	40.19
	C	7	J	0	JG 11/7	7	7	37.28	38.23
	D	10	JG	—	—	10	10	35.81	37.18
	E	10	JG	—	—	10	10	37.76	39.92
	F	10	TM	—	—	10	10	41.40	42.92
	G	7	J	0	TM 11/14	7	7	41.23	42.46
	H	10	J	—	—	10	10	40.04	41.68

Init. 1994 11/22

Balance QC	Initial (20 mg = 19.97)	Final (20 mg = 19.95)	Balance Asset #:	
Date/time In 11/21 15:00	Temp(°C) 82	Init. JG	Date/time out 11/22 15:45 Temp(°C) 79°	Init. TM
Comments:				

Reviewer J Date 12/6/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000031

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3633
	Test Start: October 21, 1999	Test End: October 31, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12622	A	7	TM	—	—	7	7	35.90	37.45
	B	10	JG	—	—	10	10	33.92	35.55
	C	8	J	0	TM 11/14	8	8	33.32	34.81
	D	9	JG	—	—	9	9	35.54	37.78
	E	10	TM	—	—	10	10	36.47	38.59
	F	10	TM	—	—	10	10	32.63	34.74
	G	8	J	0	TM 11/14	8	7	34.83	35.85
	H	7	JG	0	JG 11/14	7	7	38.00	39.57
12638	A	10	J	—	~~JG~~	10	10	36.21	37.61
	B	10	TM	—	~~TM~~	10	10	32.14	33.57
	C	9	JG	—	—	9	9	37.76	38.77
	D	10	J	—	—	10	10	40.64	42.43
	E	9	JG	—	—	9	9	35.52	36.71
	F	10	J	—	—	10	10	31.14	33.25
	G	10	TM	—	—	10	10	35.66	38.00
	H	9	TM	—	—	9	9	37.52	39.54
12639	A	9	J	—	—	9	9	34.44	35.79
	B	10	TM	—	—	10	10	37.84	38.81
	C	8	J	0	TM 11/14	8	8	34.06	36.20
	D	9	J	—	—	9	9	27.24	29.41
	E	10	J	—	—	10	10	28.68	31.15
	F	8	J	0	JG 11/14	8	8	34.61	36.40
	G	8	J	1 10/31	J	9	9	37.94	40.05
	H	10	JG	—	—	10	10	37.24	39.34
12640	A	8	J	0	JG 11/14	8	8	27.90	29.53
	B	6	J	0	JG 11/14	6	6	23.40	25.14
	C	9	JG	—	—	9	9	37.66	39.44
	D	8	J	0	JG 11/14	8	8	25.06	26.72
	E	10	J	—	—	10	10	28.45	30.63
	F	9	J	—	—	9	9	31.90	33.71
	G	10	J	—	—	10	10	34.54	36.64
	H	9	TM	—	—	9	9	33.49	35.53

Balance QC: Initial (20 mg =)	Final (20 mg =)	Balance Asset #:
Date/time In Temp(°C) Init.	Date/time out	Temp(°C) Init.
Comments:		

Reviewer: J Date: 12/8/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3633
	Test Start: October 21, 1999	Test End: October 31, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12641	A	7	J	1	JG 11/14	8	8	30.74	31.70
	B	10	J	–	–	10	10	30.83	32.75
	C	9 JG	J	–	–	9	9	31.24	32.49
	D	~~9~~ 12	~~J~~ JG	–	–	~~9~~ 12 JG	~~9~~ 12	33.61	35.62
	E	8	J	1	TM 11/14	9	9	34.36	36.17
	F	7	TM	0	JG 11/14	7	7	26.92	28.19
	G	4	J	0	TM 11/14	4	4	36.63	37.85
	H	9	J	–	–	9	9	39.97	41.38

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

Balance QC	Initial (20 mg =)		Final (20 mg =)	Balance Asset #:	
Date/time In	Temp(°C)	Init	Date/time out	Temp(°C)	Init.
Comments					

Reviewer [signature] Date 12/8/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Initial Dry Weight Data					
Replicate	# Weighed	Initial Boat Weight (mg)	Final Dry Weight (mg)	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
1	10	40.21	41.48	0.127	
2	10	43.62	44.84	0.122	
3	10	40.88	42.10	0.122	
4	10	43.05	44.15	0.110	
5	10	35.51	36.97	0.146	
6	10	38.68	39.32	0.064	
7	10	37.52	38.73	0.122	
8	10	38.76	40.04	0.128	0.118

Hyalella azteca Initial Dry Wt.

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3629 / 3633 October 21, 1999
Culture ID: 10/19	Age: 11 days	

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)	Avg. Dry WT. (mg)
1	10	40.211	41.48	0.127
2	10	43.617	44.84	0.122
3	10	40.882	42.10	0.122
4	10	43.053	44.15	0.110
5	10	35.510	36.97	0.146
6	10	38.677	39.32	0.064
7	10	37.55	38.73	0.122
8	10	38.758	40.04	0.126
				[illegible]
Initials:				
Date:				

Balance QC: Initial (20 mg = 19.96)	Final (20 mg = 19.96)	Balance Asset #:
Date/time In 12/4 1050 Temp(°C) 82°C Init. [illegible]	Date/time out 12/5 12:00 Temp(°C) 80 Init. JG	
Comments:		

Subset of organisms used for acute test starts on 10/21/99

Reviewer ________ Date ________
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared ______ Field collected ______

Hatch date 10/9-10/99 Receipt date 8/10/7-8/99

Lot number 100999Ha Strain ARO

Brood Origination US FWS MO

II. Water Quality

Temperature 24 °C Salinity —— ppt DO 7.6

pH 7.4 Hardness ≈180 ppm

III. Culture Conditions

System: FW Static renewal

Diet: Flake Food ✓ Phytoplankton ______ Trout Chow ✓

Brine Shrimp ______ Rotifers ______ Other ______

Prophylactic Treatments: ______

Comments: ______

Rec. 10/19/99
Temp 17.1°C

Used for Acute 10/19/99
Retests @ 10/21/99

IV. Shipping Information

Client: AQUARCH # of Organisms: 2500

Carrier: FED EX Date Shipped: 10/18/99

SRT on 10/23/99.

000036

Biologist: [signature]

10/20/99 JG
T=21.0°C
pH=7.9
DO=8.0
Cond.=1,700
FED YCT/Sel/4C

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629/33 Test Starts 10/21/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12611	T (°C) *	22.9	22.1	21.4/22.1	22.4/22.2	22.1/22.4	21.9/22.3	22.7/22.3	22.5/22.4	22.0/21.9	21.9/22.6	22.3
	pH	7.8	X	X	X	X	7.6	X	X	X	X	7.6
	DO (mg/L)	7.0	7.4	7.4	7.1	7.7	6.9	6.7	6.7	6.4	6.3	6.3
	Conductivity		X	X	X	X	X 250	X	X	X	X	310
	Ammonia, alk/hardness	↑ 360 ✓	X	X	X	X	X	X	X	X	X	✓
12612	T (°C)	22.1	21.7/21.6									22.6
	pH	7.9	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	6.9	7.1	6.9	6.3	7.4	6.5	6.7	6.0	6.0	7.5	5.7
	Conductivity	360	X	X	X	X	260	X	X	X	X	330
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12613	T (°C)	22.7										22.7
	pH	7.9	X	X	X	X	7.8	X	X	X	X	7.8
	DO (mg/L)	7.1	7.5	6.9	6.2	6.9	7.0	6.8	5.5	6.7	7.8	6.4
	Conductivity	350	X	X	X	X	260	X	X	X	X	340
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/21 JG	10/22 JM	10/23 JG	10/24 JG	10/25 JM	10/26 JG	10/27 JG	10/28 JM	10/29 JG	10/30 JG	10/31 TM

Comments: H. azteca added 10/21/99 JG, [illegible]
* Temperature measurement reflects measurement at two locations (two representative test beakers) on

Review: Date: 12/8/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629/33 Test Starts 10/21/99

		Day of Analysis										
Sample	**Parameter**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
12614	T (ºC)	22.7										22.0
	pH	7.8	X	X	X	X	7.7	X	X	X	X	7.7
	DO (mg/L)	7.1	6.7	6.8	6.3	6.9	6.7	6.0	6.4	5.8	7.1	5.8
	Conductivity	350	X	X	X	X	280	X	X	X	X	340
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12622	T (ºC)	22.7										22.1
	pH	7.8	X	X	X	X	7.5	X	X	X	X	7.8
	DO (mg/L)	8.0	8.0	7.3	7.5	7.9	6.9	6.7	7.0	6.8	7.7	7.1
	Conductivity	400	X	X	X	X	280	X	X	X	X	360
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12638	T (ºC)	22.7										22.6
	pH	7.3	X	X	X	X	7.8	X	X	X	X	7.7
	DO (mg/L)	6.7	7.7	7.5	7.6	7.8	7.0	6.6	6.2	5.9	7.0	6.3
	Conductivity	360	X	X	X	X	260	X	X	X	X	340
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/21 JG	10/22 JM	10/23 JG	10/24 JM	10/25 JM	10/26 JG	10/27 JG	10/28 JM	10/29 JG	10/30	10/31 JM

Comments:

Review: J Date: 12/8/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000038

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629/33 Test Starts 10/21/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12639	T (°C)	23.2										22.4
	pH	7.8	X	X	X	X	7.5	X	X	X	X	7.5
	DO (mg/L)	6.7	6.4	6.8	5.8	6.6	5.6	5.4	5.6	5.1	6.2	4.5
	Conductivity	350	X	X	X	X	X 250	X	X	X	X	320
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12640	T (°C)	23.3										22.5
	pH	7.7	X	X	X	X	7.6	X	X	X	X	7.5
	DO (mg/L)	6.6	7.4	6.8	6.7	7.4	6.5	6.4	5.7	5.3	6.5	6.4
	Conductivity	350	X	X	X	X	240	X	X	X	X	340
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
12641	T (°C)	22.7										22.1
	pH	7.6	X	X	X	X	7.5	X	X	X	X	7.6
	DO (mg/L)	6.3	7.0	6.4	5.6	6.9	5.8	5.0	4.9	5.1	6.4	5.3
	Conductivity	400	X	X	X	X	250	X	X	X	X	350
	Ammonia, alk/hardness	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/21	10/22 JM	10/23 JG	10/24 JM	10/25 JM	10/26 JG	10/27 JG	10/28 JM	10/29 JG	10/30 JG	10/31 JM

Comments:

Review: J Date: 12/8/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000039

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3641
	Test Start: October 10, 1999	Test End: October 20, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.	
12664	A	9	TM	—	—	10	10	39.18	40.98	ALL samples to chronic testing
	B	10	LS	—	—	10	10	32.99	35.06	
	C	9	RB	—	—	9	9	41.23	43.62	
	D	10	LS	—	—	10	10	36.75	39.51	
	E	10	TM	—	—	10	10	32.17	35.43	
	F	9	TM	—	—	9	9	40.12	42.65	
	G	10	LS	—	—	10	10	36.04	38.49	
	H	10	TM	—	—	10	10	35.76	38.29	
12665	A	9	LS	—	—	9	9	27.97	31.79	
	B	10	RB	—	—	10	10	29.88	33.46	
	C	10	LS	—	—	10	10	29.18	32.64	
	D	10	TM	—	—	10	10	28.55	32.54	
	E	10	TM	—	—	10	10	29.28	33.98	
	F	9	LS	—	—	9	9	28.25	32.36	
	G	10	RB	—	—	10	10	31.97	35.91	
	H	10	LS	—	—	10	10	24.38	28.25	
12666	A	9	RB	—	—	9	9	34.15	37.52	
	B	10	TM	—	—	10	10	34.11	① 38.09	
	C	10	TM	—	—	10	10	35.53 ~~34.10~~ JG	39.32	
	D	10	LS	—	—	10	10	37.52 ~~35.53~~ JG	41.57	
	E	10	TM	—	—	10	10	29.64 ~~37.52~~ JG	33.32	
	F	10	TM	—	—	10	10	32.57 ~~29.66~~ JG	36.79	
	G	9	LS	—	—	9	9	32.96	37.95	
	H	10	RB	—	—	10	10	31.85	34.27	* Init. Pan wt
12671	A	10	jm	—	~~10~~ jm	10	10	30.81	27.91	25.12
	B	8	LS	—	—	8	8	26.79	33.41	30.63
	C	10	TM	—	—	10	10	29.98	32.94	30.06
	D	10	RB	—	—	10	10	23.66	36.48	33.29
	E	9	RB	—	—	10	10	26.13	32.75	29.46
	F	10	RB	—	—	10	10	29.22	33.01	29.84
	G	10	TM	—	—	10	10	21.52	36.73	32.94
	H	10	TM	—	—	10	10	24.02	36.32	32.14

Balance QC: Initial (20 mg = 19.92)	Final (20 mg = 19.92)	Balance Asset #:
Date/time In 11/22 11:45 Temp(°C) 82 Init. JG	Date/time out 11/23 12:45 Temp(°C) ~~82~~ Init. JG	
Comments:		

Reviewer: J Date: 12/8/99 ① pan wts. recorded in wrong spaces; corrected. JG 11/22

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

JG 11/23 Corrected * Initial pan wts. for '668 recorded in spaces for 12671 Init. p.

000040

Amphipod (*Hyalella azteca*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3641
	Test Start: October 10, 1999	Test End: October 20, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.	Init Pan Wt. *
12668	A	10	TM	—	—	10	10	~~25.12~~	~~27.91~~ JG 33.71	30,81
	B	10	LS	—	—	10	10	~~30.63~~	29.62	26,79
	C	10	TM	—	—	10	10	~~30.06~~	32.17	29,98
	D	10	RB	—	—	10	10	~~33.29~~	26.88	23,66
	E	9	LS	—	—	9	9	~~JG 29.46~~	28.60	26,13
	F	10	TM	—	—	10	10	~~29.84~~	32.29	29,22
	G	9	RB	—	—	9	9	~~32.94~~	23.68	21.52
	H	10	TM	—	—	10	10	~~32.14~~	26.59	24.02

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

0000411

Balance QC Initial (20 mg = 19.91)	Final (20 mg =)	Balance Asset #:
Date/time In Temp(°C) Init	Date/time out	Temp(°C) Init.
Comments		

Reviewer ________ Date ________

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

* Init. pan wts. for '671 recorded in spaces for 12668 Init. pan wts. Corrected. 11/23 JG

Hyalella azteca Acute
Initial Weight Results
10/9/99

Menzie Cura
Dead Creek
99033

BTR 3641
Aquatec Biological Sciences

Initial Dry Weight Data					
Replicate	# Weighed	Initial Boat Weight (mg)	Final Dry Weight (mg)	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
1	10	26.13	26.42	0.029	
2	10	28.00	28.23	0.023	
3	10	33.61	33.98	0.037	
4	10	24.48	24.84	0.036	
5	10	25.80	26.22	0.042	
6	10	29.37	30.00	0.063	
7	10	29.15	29.68	0.053	
8	10	26.92	27.37	0.045	0.041

Hyalella azteca Initial Dry Wt.

Client: Menzie-Cura & Assoc.	Project: ~~99026~~ 99033	BTR: ~~3152 / 3153~~ 3641
Culture ID: 10/1	Age: 10 days (on 10/9/99)	

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)
1	10	26.13	26.42
2	10	28.00	28.23
3	10	33.61	33.98
4	10	24.48	24.84
5	10	25.80	26.22
6	10	29.37	30.00
7	10	29.15	29.68
8	10	26.92	27.37
Initials: JM			
Date: 12/8/99			

Balance QC: Initial (20 mg = 19.98) Final (20 mg = 19.96) Balance Asset #:	
Date/time In 12/8 15:30 Temp(°C) 60°C Init. JM	Date/time out 12/9/99 15:10 Temp(°C) 60°C Init. [illegible]
Comments: 12/9/99. Power out for ~3 min (oven reset)	

Organisms preserved (subsample) on 10/9/99
Organisms used for acute tests initiated 10/10/99

Reviewer ________ Date ________
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared ______ Field collected ______

Hatch date 09/29/99 Receipt date ______

Lot number 092999H9 Strain ARO

Brood Origination USFW MO

II. Water Quality

Temperature 25 °C Salinity — ppt DO 7.6

pH 7.4 Hardness ≈200 ppm

III. Culture Conditions

System: FW STATIC

Diet: Flake Food ✓ Phytoplankton ______ Trout Chow ✓

Brine Shrimp ______ Rotifers ______ Other ______

Prophylactic Treatments: ______

Comments: ______

IV. Shipping Information

Client: AQUATECH # of Organisms: 1500+

Carrier: FED EX Date Shipped: 9-30-99

Biologist: [signature]

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

Organism Holding and Acclimation

Species. *Hyalella azteca*	Date Received: 10/1/99 No. Rec. 1500
Supplier: ARO	Hatch Date: 9/29/99
Apparent Conditon. Excellent	Culture ID: 10/1

Acclimation / Holding Procedures: Transfer to holding culture boxes, add laboratory water. Acclimate to water to be used for testing (sediment overlying water formulation). Aerate lightly. Water change once (50%) weekly.
Daily Feeding: 1:1 mix of *Selenastrum* / YCT. 1-3 mL (maintain hint of green algal coloration on culture box bottom). Also, pinch of ground Tetrafin/Ceraphyll. Do not allow excess food/fungus to accumulate.
Monitoring: Examine over a light box daily. record apparent condition. Temperature daily; pH. D.O. on Mon., Weds., Fri.. (miniumum). Conductivity weekly.
Test starts record date. time. initials for sediment test and SRT test starts.

1999 Date	Fed	Temp	pH	D.O.	Conduct.	Water Chg.	Age (Days)	Init.
10/1	Sel/YCT	21.5	7.4	9.4	1,300		2 Normal	JG
10/2	Sel/YCT	20.5				25%	3 Normal	JG
10/3	Sel/YCT	21.0					4 N	JG
10/4	Sel/YCT	20.7				50%	5 N	JG
10/5	Sel/YCT	21.0	7.9	7.4	750	50%	6 N	JG
10/6	Sel/YCT	22.5	—	—	—	—	7	[illegible]
10/7	Sel/YCT	21.4	7.8	7.1	600	—	8 Normal	JM
10/8	YCT/Sel	22.2	—	—	—	—	9 Normal	JM
10/9	YCT/Sel	22.0					10 Normal	JG
10/10	YCT/Sel	22.3					11 Normal	JG
10/11							12	
10/12							13	

* N = normal, appear healthy. Record # dead if any observed.

Sediment test start (Date/time/Init.) 10/10/99 SRT test start: (Date/time/init.) 10/8/99

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Starts 10/10/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12664	T (°C)	22.8	21.5	23.1	22.9	22.8	22.8	22.9	23.2	23.2	23.1	23.7
	pH	8.0	X	X	X	X	8.0	X	X	X	X	7.9
	DO (mg/L)	7.4	7.4	6.9	7.1	7.1	7.6	7.9	6.4	6.9	7.0	6.7
	Conductivity	390	X	X	X	X	350	X	X	X	X	380
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12665	T (°C)	22.6	21.8	22.9	23.0	23.1	23.5	23.2	23.5	23.2	23.2	23.6
	pH	7.7	X	X	X	X	~~8.~~ JG 7.9	X	X	X	X	8.0
	DO (mg/L)	6.4	6.6	6.2	6.1	6.0	~~5~~ 6.3	7.2	4.8	5.9	4.7	5.8
	Conductivity	410	X	X	X	X	370	X	X	X	X	400
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12666	T (°C)	22.5	21.9	22.9	23.0	23.1	23.4	23.2	23.7	23.4	23.3	22.8
	pH	7.5	X	X	X	X	7.6	X	X	X	X	7.4
	DO (mg/L)	5.0	4.0	4.1	4.0	3.6*	6.1	6.8	3.5	4.7	5.1	4.9
	Conductivity	420	X	X	X	X	360	X	X	X	X	380
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/10 JG	10/11 JG	10/12 JG	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JM	10/18 w	10/19 w	10/20 w

Comments: H. azteca added to beakers 10/10/99 14:30 JG

* Gave 12666 an extra renewal manually ~~10:00~~ 16:00 JM 10/14/99

Review: [illegible] Date: 12/8/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000046

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Starts 10/10/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12667 JG 71	T (°C)	22.8	21.9	22.6	22.8	23.0	23.5	23.2	23.4	23.6	23.4	23.3
	pH	7.6	X	X	X	X	7.9	X	X	X	X	8.6
	DO (mg/L)	6.2	6.9	6.7	6.0	5.6	~~7.3~~ 6.8 JG	7.2	6.1	6.7	~~7.6~~ 5.6	8.8
	Conductivity	300	X	X	X	X	380	X	X	X	X	400
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12668	T (°C)	22.7	21.8	22.8	23.1	23.2	23.3	23.3	23.4	23.5	23.3	23.4
	pH	7.7	X	X	X	X	8.0	X	X	X	X	8.1
	DO (mg/L)	7.4	7.5	6.9	6.8	6.7	7.3	7.7	6.9	6.7	~~7.6~~ 6.6	7.1
	Conductivity	420	X	X	X	X	370	X	X	X	X	372
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	T (°C)											
	pH		X	X	X	X		X	X	X	X	
	DO (mg/L)											
	Conductivity		X	X	X	X		X	X	X	X	
	Ammonia, alk/hardness Sulfide		X	X	X	X	X	X	X	X	X	
	Init./Date (1999):	10/10 JG	10/11 JG	10/12 JG	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JM	10/18	10/19	10/20

Comments:

Review: ______ Date: 12/8/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000047

ALKALINITY & HARDNESS WORKSHEET

BTR Number: Several Project #: 99033 Analyst: LS

Species: *Hyallela azteca* Analysis

Test Facility: Aquatec Biological Sciences, South Burlington, Vermont Date: 10/13/99 12/2/99

Project: Menzie-Cura Dead Creek Acute Tests 12/7/99

		ALKALINITY				HARDNESS			
Date	Sample Type	Sample ml	Initial ml	Final ml	Alkalinity (mg/L)	Sample ml	Initial ml	Final ml	Hardness (mg/L)
10/10/99	12664 Day 0	50	35.9	37.2	26.0	50	34.0	42.0	160.0
10/10/99	12665 Day 0	50	37.2	39.2	40.0	50	0.8	7.9	142.0
10/10/99	12666 Day 0	50	39.2	41.5	46.0	50	7.9	16.0	162.0
10/10/99	12668 Day 0	50	41.5	43.4	38.0	50	16.0	23.5	150.0
10/10/99	12671 Day 0	50	43.4	44.9	30.0	50	23.5	30.2	134.0
10/19/99	12546 Day 0	50	0.2	2.3	42.0	50	0.1	11.6	230.0
10/19/99	12547 Day 0	50	2.3	4.6	46.0	30	11.6	17.7	203.3
10/19/99	12548 Day 0	50	4.6	6.9	46.0	50	17.7	26.8	182.0
10/19/99	12549 Day 0	50	6.9	9.1	44.0	50	26.8	36.7	198.0
10/19/99	12550 Day 0	50	9.1	11.2	42.0	50	36.7	45.7	180.0
10/19/99	12551 Day 0	50	11.2	13.4	44.0	50	0.1	9.0	178.0
10/19/99	12552 Day 0	50	13.4	15.9	50.0	50	9.0	19.6	212.0
10/19/99	12589 Day 0	50	15.9	17.8	38.0	50	26.6	33.7	142.0
10/19/99	12590 Day 0	50	17.8	19.7	38.0	50	33.7	40.7	140.0
10/19/99	12591 Day 0	50	19.7	21.6	38.0	50	0.2	18.2	360.0
10/19/99	12592 Day 0	50	21.6	23.6	40.0	50	18.2	27.5	186.0
10/19/99	12593 Day 0	50	23.6	25.4	36.0	50	27.5	37.1	192.0
10/19/99	12609 Day 0	50	25.4	27.5	42.0	50	37.1	46.6	190.0
10/19/99	12610 Day 0	50	27.5	29.5	40.0	50	0.1	11.7	232.0
10/21/99	12611 Day 0	50	0.4	2.6	44.0	50	15.7	24.3	172.0
10/21/99	12612 Day 0	50	2.6	4.5	38.0	50	24.3	32.4	162.0
10/21/99	12613 Day 0	50	4.5	6.4	38.0	50	32.4	40.5	162.0
10/21/99	12614 Day 0	50	6.4	8.0	32.0	50	0.1	8.0	158.0
10/21/99	12622 Day 0	50	8.0	10.2	44.0	50	8.0	17.6	192.0
10/21/99	12638 Day 0	50	10.2	12.1	38.0	50	17.6	25.3	154.0
10/21/99	12639 Day 0	30	12.1	13.2	36.7	20	25.3	28.7	170.0
10/21/99	12640 Day 0	50	13.2	14.8	32.0	50	28.7	37.8	182.0
10/21/99	12641 Day 0	50	14.8	16.9	42.0	50	37.8	46.5	174.0

J 12/8/99

ALKALINITY & HARDNESS WORKSHEET

BTR Number: Several Project #: 99033 Analyst: LS

Species: *Hyalella azteca* Analysis

Test Facility: Aquatec Biological Sciences, South Burlington, Vermont Dates: 11/21/99 12/2/99

Project: Menzie-Cura Dead Creek Acute Tests 12/7/99

		ALKALINITY				HARDNESS			
Date	Sample Type	Sample ml	Initial ml	Final ml	Alkalinity (mg/L)	Sample ml	Initial ml	Final ml	Hardness (mg/L)
10/20/99	12664 Day 10 HA	50	32.1	34.0	38.0	50	24.1	31.8	154.0
10/20/99	12665 Day 10 HA	50	34.0	36.3	46.0	50	31.8	39.8	160.0
10/20/99	12666 Day 10 HA	50	36.3	38.4	42.0	50	39.8	46.5	134.0
10/20/99	12668 Day 10 HA	50	38.4	40.1	34.0	50	0.2	7.4	144.0
10/20/99	12671 Day 10 HA	50	40.1	42.2	42.0	50	7.4	15.0	152.0
10/29/99	12546 Day 10 HA	50	1.9	3.6	34.0	50	19.1	25.3	124.0
10/29/99	12547 Day 10 HA	50	3.6	5.4	36.0	50	25.3	31.5	124.0
10/29/99	12548 Day 10 HA	50	5.4	7.2	36.0	50	31.5	37.1	112.0
10/29/99	12549 Day 10 HA	50	7.2	8.9	34.0	50	37.1	42.7	112.0
10/29/99	12550 Day 10 HA	50	8.9	10.4	30.0	50	42.7	48.3	112.0
10/29/99	12551 Day 10 HA	50	10.4	12.1	34.0	50	0.3	6.1	116.0
10/29/99	12552 Day 10 HA	50	12.1	13.9	36.0	50	6.1	12.3	124.0
10/29/99	12589 Day 10 HA	50	13.9	15.8	38.0	50	12.3	18.5	124.0
10/29/99	12590 Day 10 HA	50	15.8	17.7	38.0	50	18.5	24.1	112.0
10/29/99	12591 Day 10 HA	50	17.7	19.2	30.0	50	24.1	30.5	128.0
10/29/99	12592 Day 10 HA	50	19.2	21.0	36.0	50	30.5	36.4	118.0
10/29/99	12593 Day 10 HA	50	21.0	22.5	30.0	50	36.4	42.0	112.0
10/29/99	12609 Day 10 HA	50	22.5	25.1	52.0	50	42.0	48.7	134.0
10/29/99	12610 Day 10 HA	50	25.1	27.0	38.0	50	0.1	6.9	136.0
10/31/99	12611 Day 10 HA	50	29.5	31.1	32.0	50	11.7	19.8	162.0
10/31/99	12612 Day 10 HA	50	31.1	32.9	36.0	50	19.8	28.0	164.0
10/31/99	12613 Day 10 HA	50	32.9	34.7	36.0	50	28.0	36.4	168.0
10/31/99	12614 Day 10 HA	50	34.7	36.3	32.0	50	36.4	44.7	166.0
10/31/99	12622 Day 10 HA	50	36.3	38.2	38.0	50	0.2	8.9	174.0
10/31/99	12638 Day 10 HA	50	38.2	39.9	34.0	50	8.9	16.7	156.0
10/31/99	12639 Day 10 HA	50	39.9	41.5	32.0	50	16.7	24.5	156.0
10/31/99	12640 Day 10 HA	50	41.5	43.2	34.0	50	24.5	32.8	166.0
10/31/99	12641 Day 10 HA	50	43.2	45.0	36.0	50	32.8	40.6	156.0

J 12/8/99

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3629
Sample Description: Day 0 Ha. 10/21		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12611	10/21	50ml	0.4	2.6	12/2 98	50ml	15.7	24.3	12/7 98	
12			2.6	4.5			24.3	32.4		
13			4.5	6.4			32.4	40.5		
14			6.4	8.0			0.1	8.0		
12622			8.0	10.2			8.0	17.6		
38			10.2	12.1			17.6	25.3		
39		30ml	12.1	13.2		20ml	25.3	28.7		
40		50ml	13.2	14.8		50ml	28.7	37.8		
41			14.8	16.9			37.8	46.5		

Alkalinity and Hardness Analysis

Client: Menzie-Cura Project: 99033 BTR: 3615

Sample Description: Day 0 10/19

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12546	10/19	50ml	0.2	2.3	12/2 ES	50ml	0.1	11.6	12/7 ES	
47			2.3	4.6		30ml	11.6	17.7		
48			4.6	6.9		50ml	17.7	26.8		
49			6.9	9.1			26.8	30.7		
50			9.1	11.2			30.7	45.7		
51			11.2	13.4			0.1	9.0		
52			13.4	15.9			9.0	19.6		

J 12/8/99

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3622
Sample Description: Day 0 H.a 10/19		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12589	10/19	50ml	15.9	17.8	12/2 88	50ml	26.6	33.7	12/7 88	
90			17.8	19.7			33.7	40.7		
91			19.7	21.6			0.2	18.2		
92			21.6	23.6			18.2	27.5		
93			23.6	25.4			27.5	37.1		
12609			25.4	27.5			37.1	46.6		
610			27.5	29.5			0.1	11.7		

J 12/8/99

Alkalinity and Hardness Analysis

Client: Menzie-Cura Project: 94033 BTR:

Sample Description: Day 0 HA/CT

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
	12611	10/9	50ml	37.8	39.8	10/13	50ml	30.2	37.4	10/13	11/23 RB
	12612	10/9	50	39.8	41.8	10/13		37.4	45.0		
	12613	10/9	50	41.8	43.7	10/13		0.8	9.0		
	12614	10/9	50	0.4	2.5	10/13		9.0	16.5		
	12622	10/9	50	2.5	4.4	10/13		16.5	24.1		
	12638	10/9	50	4.4	6.6	10/13		24.1	32.2		
	12639	10/9	50	6.6	8.3	10/13		32.2	38.6		
	12640	10/9	50	8.3	10.0	10/13		38.6	46.1		
	12641	10/9	50	10.0	12.0	10/13	~~50~~ 30	0.6	5.2		
23											
12546	~~10546~~	10/7	50	12.0	13.5	10/13	50ml	10.4	23.1	10/13	11/23 RB
12547	10547	10/7	50	13.5	15.3	10/13		23.1	28.7		
12548	10548	10/7	50	15.3	17.0	10/13		28.7	34.6		
12549	10549	10/7	50	17.0	18.7	10/13		34.6	40.6		
12550	10550	10/7	50	18.7	20.4	10/13		40.6	46.5		
12551	10551	10/7	50	20.4	22.2	10/13		0.6	6.3		
12552	10552	10/7	50	22.2	24.0	10/13		6.3	12.7		
12589	10589	10/8	50	24.0	25.4	10/13		12.7	19.0		
12590	10590	10/8	50	25.4	26.9	10/13		19.0	25.5		
12591	10591	10/8	50	26.9	28.3	10/13		25.5	49.3		
12592	10592	10/8	50	28.3	29.9	10/13		1.0	7.3		
12593	10593	10/8	50	29.9	31.3	10/13		7.3	13.2		
12609	10609	10/8	50	3.3	33.0	10/13		13.2	20.0		
12610	10610	10/8	50	33.0	34.4	10/13		20.0	27.8		
12615	10615	10/8	50	34.4	35.9	10/13		27.8	34.0		
	12664	10/10	50	35.9	37.2	10/13		34.0	42.0		
	12665	10/10	50	37.2	39.2	10/13		0.8	7.9		
	12666	10/10	50	39.2	41.5	10/13		7.9	16.0		
	12668	10/10	50	41.5	43.4	10/13		16.0	23.5		
	12671	10/10	50	43.4	44.9	10/13		23.5	30.2		

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3641
Sample Description: Day 10 H.a. + C.t. 10/20		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
H.a. 121064	10/20	50ml	32.1	34.0	12/2 YS	50ml	24.1	31.8	12/7 YS ~~50ml~~	
65			34.0	36.3			31.8	39.8		
66			36.3	38.4			39.8	46.5		
68			38.4	40.1			0.2	7.4		
71			40.1	42.2			7.4	15.0		
C.t. 121064	10/20	50ml	42.2	44.2	12/2 YS	50ml	15.0	22.5	12/7 YS	
65			44.2	46.0			22.5	29.5		
66			46.0	47.9			29.5	36.9		
68			0.2	1.8			36.9	42.4		
71			1.8	3.9			0.4	7.9		

J 12/8/99

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Alkalinity and Hardness Analysis

Client: ~~Menzie-Cura~~ ES Menzie Cura	Project: 94033	BTR: 3615
Sample Description: ~~Day~~ Day 10 H.a.		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12546	10/29	50ml	1.9	3.6	YS 11/21	50ml	19.1	25.3	11/21 YS	11/23 RB
12547			3.6	5.4			25.3	31.5		
12548			5.4	7.2			31.5	37.1		
12549			7.2	8.9			37.1	42.7		
12550			8.9	10.4			42.7	48.3		
12551			10.4	12.1			0.3	6.1		
12552			12.1	13.9			6.1	12.3		
12589	10/29	50ml	13.9	15.8	YS 11/21	50ml	12.3	18.5	11/21 YS	11/23 RB
12590			15.8	17.7			18.5	24.1		
12591			17.7	19.2			24.1	30.5		
12592			19.2	21.0			30.5	36.4		
12593			21.0	22.5			36.4	42.0		
12609			22.5	25.1			42.0	48.7		
12610			25.1	27.0			0.1	6.9		

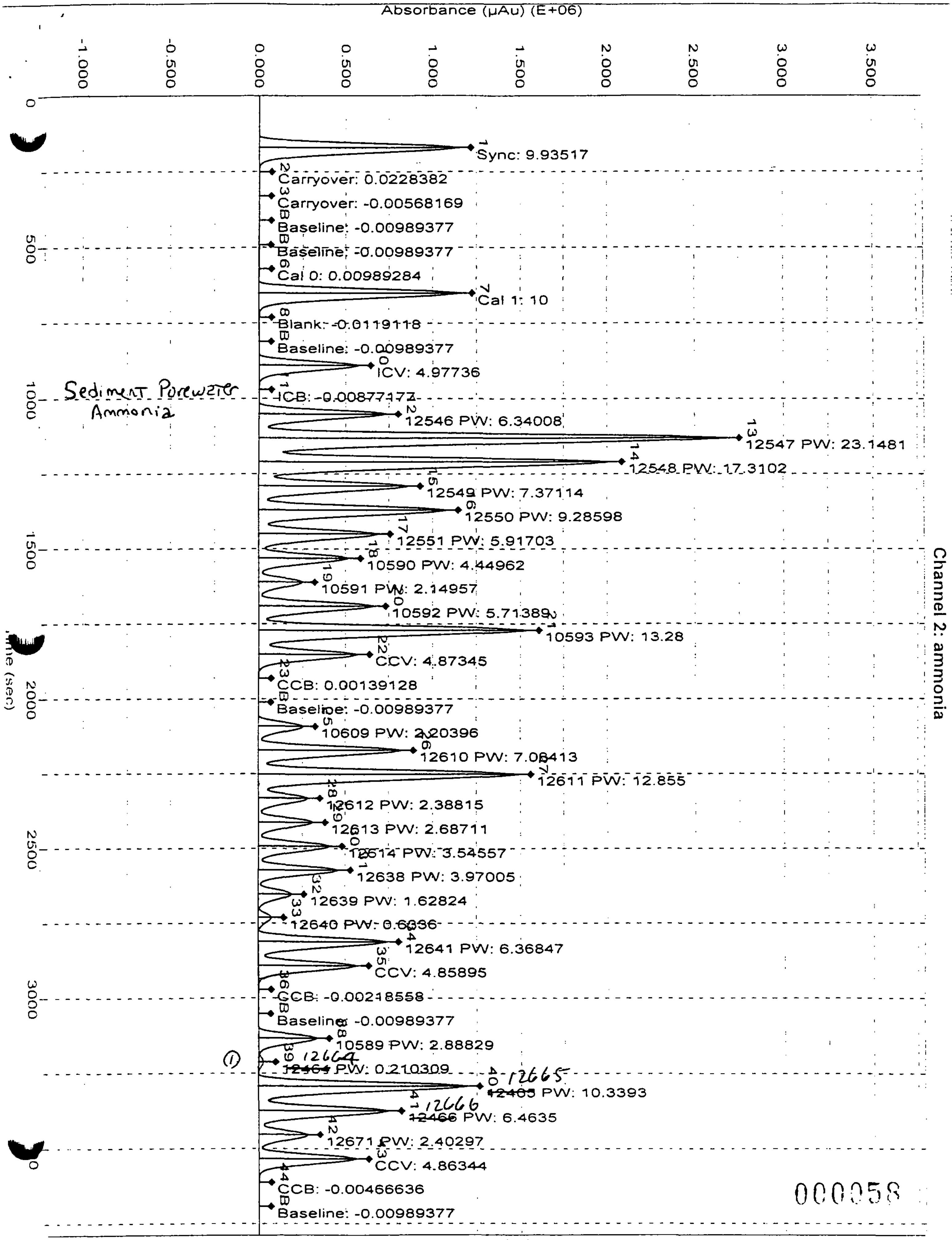
Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3629 / 3633
Sample Description: Day 10 H.a. 10/31		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12611	10/31	50ml	29.5	31.1	12/2 JB	50ml	11.7	19.8	12/7 JB	
12			31.1	32.9			19.8	28.0		
13			32.9	34.7			28.0	36.4		
14			34.7	36.3			36.4	44.7		
12622			36.3	38.2			0.2	8.9		
38			38.2	39.9			8.9	16.7		
39			39.9	41.5			16.7	24.5		
40			41.5	43.2			24.5	32.8		
41			43.2	45.0			32.8	40.6		

Results of Ammonia Analyses (Total, mg/L) *Hyalella azteca* / Dead Creek / Project 99033			
Sample ID	Porewater	Day 0 Overlying Water	Day 10 Overlying Water
12546	6.3	1.4	<0.5
12547	23.1	6.2	2.5
12548	17.3	4.1	0.5
12549	7.4	1.7	0.6
12550	9.3	2.2	0.9
12551	5.9	1.5	0.9
12552	-	<0.5	<0.5
12589	2.9	0.7	0.7
12590	4.4	0.8	<0.5
12591	2.1	0.5	<0.5
12592	5.7	1.6	0.7
12593	13.3	3.0	0.5
12609	2.2	<0.5	<0.5
12610	7.1	1.2	<0.5
12611	12.9	2.2	<0.5
12612	2.4	0.6	<0.5
12613	2.7	0.6	0.7
12614	3.5	0.8	<0.5
12622	-	<0.5	<0.5
12638	4.0	0.9	0.5
12639	1.6	0.7	0.8
12640	0.6	<0.5	<0.5
12641	6.4	2.1	1.1
12664	<0.5	<0.5	<0.5
12665	10.3	3.4	1.8
12666	6.7	2.2	2.3
12668	-	<0.5	0.6
12671	2.4	0.7	<0.5

J, 2/18/99



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Sample Number Corrections 12/8/99

Peak Table: ammonia

File name: C:\FLOW_4\101299B.RST
Date: October 12, 1999
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1150681	9.935171
2	0	Carryover	CO	1	1	3787	0.022838
3	0	Carryover	CO	1	1	487	-0.005682
B	0	Baseline	RB	1	1	0	-0.009894
B	0	Baseline	RB	1	1	0	-0.009894
6	1	Cal 0	C	1	1	2289	0.009893
7	2	Cal 1	C	1	1	1158182	10.000000
8	0	Blank	U	1	1	-233	-0.011912
B	0	Baseline	RB	1	1	0	-0.009894
10	3	ICV	U	1	1	577044	4.977356
11	1	ICB	U	1	1	130	-0.008772
12	31	12546 PW	U	1	1	734716	6.340084
13	32	12547 PW	U	1	1	2679467	23.148100
14	33	12548 PW	U	1	1	2004003	17.310225
15	34	12549 PW	U	1	1	854013	7.371138
16	35	12550 PW	U	1	1	1075568	9.285980
17	36	12551 PW	U	1	1	685767	5.917027
18	37	12590 PW	U	1	1	515983	4.449624
19	38	12591 PW	U	1	1	249859	2.149575
20	39	12592 PW	U	1	1	662263	5.713890
21	40	12593 PW	U	1	1	1537687	13.279972
22	3	CCV	U	1	1	565021	4.873451
23	1	CCB	U	1	1	1306	0.001391
B	0	Baseline	RB	1	1	0	-0.009894
25	41	12609 PW	U	1	1	256151	2.203963
26	42	12610 PW	U	1	1	820805	7.084130
27	43	12611 PW	U	1	1	1488515	12.854989
28	44	12612 PW	U	1	1	277463	2.388149
29	45	12613 PW	U	1	1	312054	2.687114
30	46	12614 PW	U	1	1	411381	3.545574
31	47	12638 PW	U	1	1	460495	3.970054
32	48	12639 PW	U	1	1	189538	1.628238
33	49	12640 PW	U	1	1	74455	0.633600
34	50	12641 PW	U	1	1	738001	6.368472
35	3	CCV	U	1	1	563344	4.858951
36	1	CCB	U	1	1	892	-0.002186
B	0	Baseline	RB	1	1	0	-0.009894
38	51	12589 PW ①	U	1	1	335331	2.888294
39	52	~~12464~~ PW 12664	U	1	1	25478	0.210309
40	53	~~12465~~ PW 12665	U	1	1	1197437	10.339272
41	54	~~12466~~ PW 12666	U	1	1	748996	6.463504
42	55	12671 PW	U	1	1	279177	2.402970
43	3	CCV	U	1	1	563863	4.863436
44	1	CCB	U	1	1	605	-0.004666
B	0	Baseline	RB	1	1	0	-0.009894

① Sample No. Correction
J 12/8/99

Peak	Cup	Flags
1	2	
2	0	
3	0	CO
B	0	BL

Peak	Cup	Flags
B	0	BL
6	1	
7	2	
[illegible]	0	LO
B	0	BL
10	3	
11	1	LO
12	31	
13	32	
14	33	
15	34	
16	35	
17	36	
18	37	
19	38	
20	39	
21	40	
22	3	
23	1	
B	0	BL
25	41	
26	42	
27	43	
28	44	
29	45	
30	46	
31	47	
32	48	
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35	3	
36	1	LO
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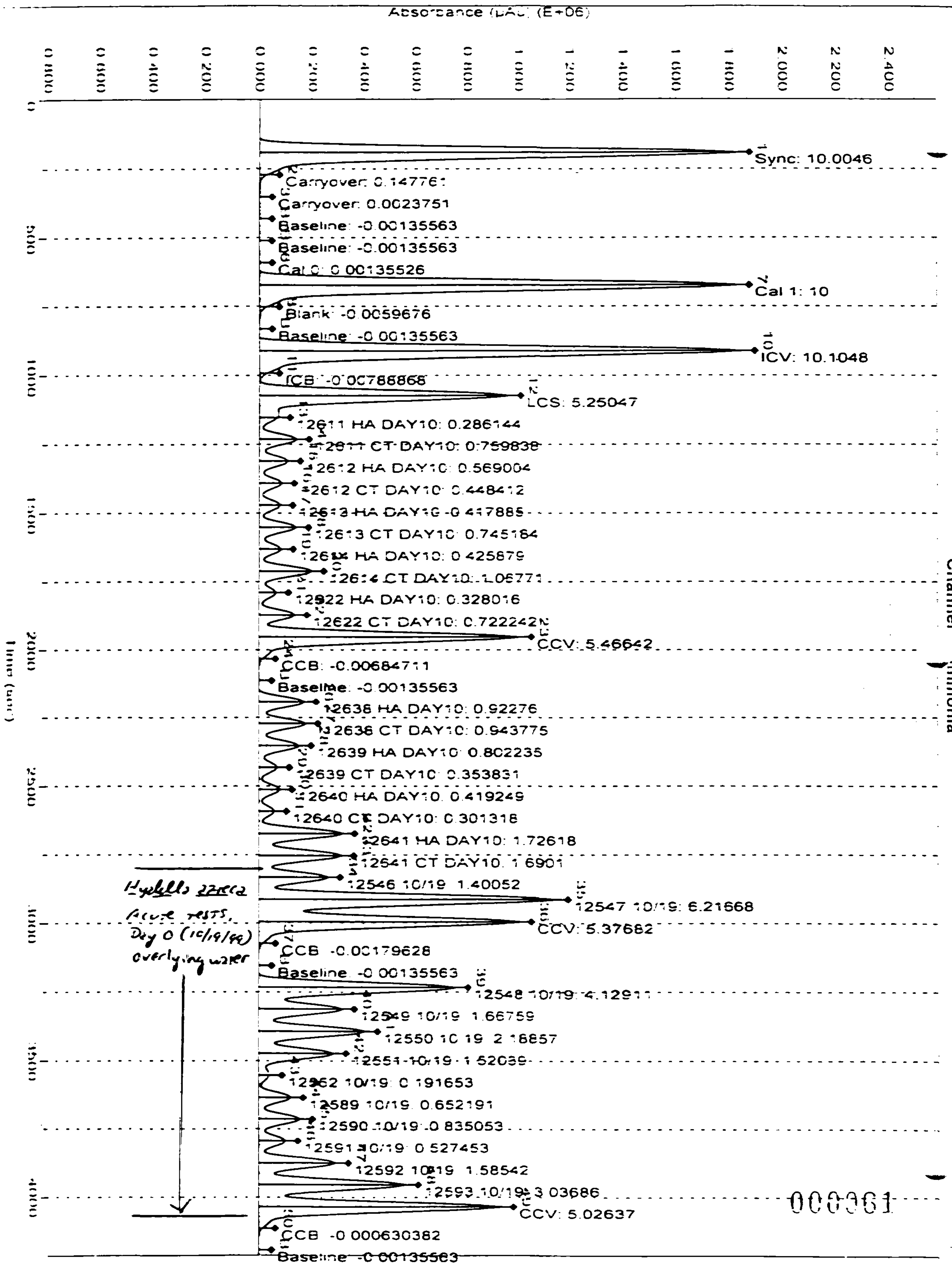
38	51	
39	52	
40	53	
41	54	
42	55	
43	3	
44	1	LO
B	0	BL



Absorbance (µAU) (E+06)
Time (sec)
Channel : Ammonia
Sync: 10.0046
Carryover: 0.147761
Carryover: 0.0023751
Baseline: -0.00135563
Baseline: -0.00135563
Cal 0: 0.00135526
Cal 1: 10
Blank: -0.0059676
Baseline: -0.00135563
ICV: 10.1048
ICB: -0.00788868
LCS: 5.25047
12611 HA DAY10: 0.286144
12611 CT DAY10: 0.759838
12612 HA DAY10: 0.569004
12612 CT DAY10: 0.448412
12613 HA DAY10: 0.417885
12613 CT DAY10: 0.745184
12614 HA DAY10: 0.425879
12614 CT DAY10: 1.05771
12622 HA DAY10: 0.328016
12622 CT DAY10: 0.722242
CCV: 5.46642
CCB: -0.00684711
Baseline: -0.00135563
12638 HA DAY10: 0.92276
12638 CT DAY10: 0.943775
12639 HA DAY10: 0.802235
12639 CT DAY10: 0.353831
12640 HA DAY10: 0.419249
12640 CT DAY10: 0.301318
12641 HA DAY10: 1.72618
12641 CT DAY10: 1.6901
12546 10/19: 1.40052
12547 10/19: 6.21668
CCV: 5.37682
CCB: -0.00179628
Baseline: -0.00135563
12548 10/19: 4.12911
12549 10/19: 1.66759
12550 10/19: 2.18857
12551 10/19: 1.52039
12562 10/19: 0.191653
12589 10/19: 0.652191
12590 10/19: 0.835053
12591 10/19: 0.527453
12592 10/19: 1.58542
12593 10/19: 3.03686
CCV: 5.02637
CCB: -0.000630382
Baseline: -0.00135563
Hyalella azteca
Acute tests,
Day 0 (10/19/99)
overlying water

000361

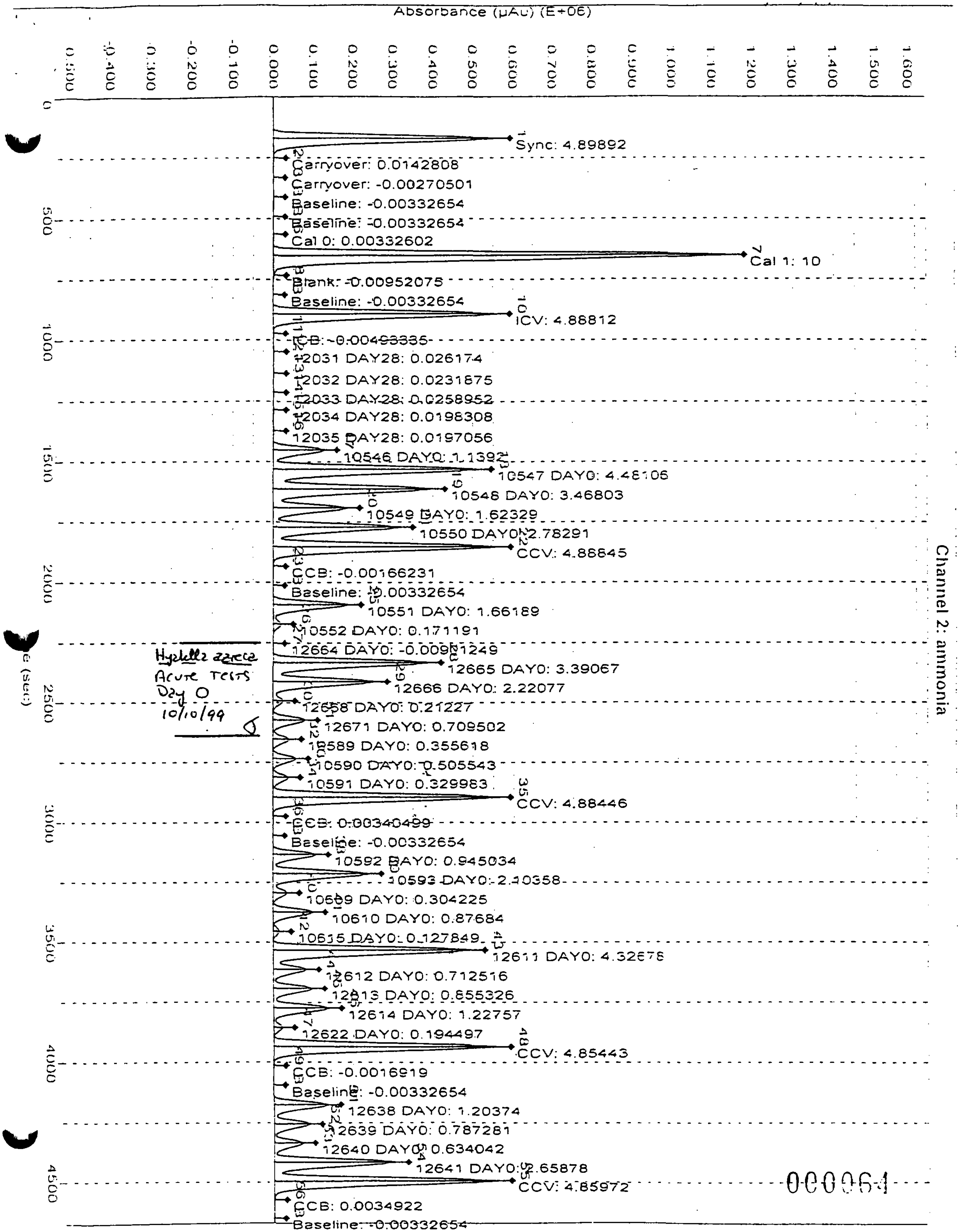
Peak Table: ammonia

File name: F:\FLOW_4\102799D.RST
Date: October ~~28~~, 1999
Operator: LKS 27 [illegible]

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1828142	10.004595
2	0	Carryover	CO	1	1	27244	0.147761
3	0	Carryover	CO	1	1	682	0.002375
B	0	Baseline	RB	1	1	0	-0.001356
B	0	Baseline	RB	1	1	0	-0.001356
6	1	Cal 0	C	1	1	495	0.001355
7	2	Cal 1	C	1	1	1827302	10.000000
8	0	Blank	U	1	1	-843	-0.005968
B	0	Baseline	RB	1	1	0	-0.001356
10	2	ICV	U	1	1	1846458	10.104847
11	1	ICB	U	1	1	-1194	-0.007889
12	3	LCS	U	1	1	959538	5.250472
13	31	12611 HA DAY10	U	1	1	52528	0.286144
14	32	12611 CT DAY10	U	1	1	139074	0.759838
15	33	12612 HA DAY10	U	1	1	104208	0.569004
16	34	12612 CT DAY10	U	1	1	82175	0.448412
17	35	12613 HA DAY10	U	1	1	76598	0.417885
18	36	12613 CT DAY10	U	1	1	136397	0.745184
19	37	12614 HA DAY10	U	1	1	78058	0.425879
20	38	12614 CT DAY10	U	1	1	195324	1.067707
21	39	12622 HA DAY10	U	1	1	60178	0.328016
22	40	12622 CT DAY10	U	1	1	132205	0.722242
23	3	CCV	U	1	1	998992	5.466417
[illegible]	1	CCB	U	1	1	-1003	-0.006847
B	0	Baseline	RB	1	1	0	-0.001356
26	41	12638 HA DAY10	U	1	1	168841	0.922760
27	42	12638 CT DAY10	U	1	1	172681	0.943775
28	43	12639 HA DAY10	U	1	1	146820	0.802235
29	44	12639 CT DAY10	U	1	1	64895	0.353831
30	45	12640 HA DAY10	U	1	1	76847	0.419249
31	46	12640 CT DAY10	U	1	1	55300	0.301318
32	47	12641 HA DAY10	U	1	1	315631	1.726184
33	48	12641 CT DAY10	U	1	1	309039	1.690103
34	49	12546 10/19	U	1	1	256130	1.400515
35	50	12547 10/19	U	1	1	1136070	6.216682
36	3	CCV	U	1	1	982623	5.376822
37	1	CCB	U	1	1	-81	-0.001796
B	0	Baseline	RB	1	1	0	-0.001356
39	51	12548 10/19	U	1	1	754658	4.129107
40	52	12549 10/19	U	1	1	304925	1.667588
41	53	12550 10/19	U	1	1	400111	2.188566
42	54	12551 10/19	U	1	1	278030	1.520385
43	55	12552 10/19	U	1	1	35264	0.191653
44	56	12589 10/19	U	1	1	119406	0.652191
45	57	12590 10/19	U	1	1	152816	0.835053
46	58	12591 10/19	U	1	1	96616	0.527453
47	59	12592 10/19	U	1	1	289912	1.585416
48	60	12593 10/19	U	1	1	555099	3.036863
	3	CCV	U	1	1	918593	5.026368
[illegible]	1	CCB	U	1	1	133	-0.000630
B	0	Baseline	RB	1	1	0	-0.001356

Peak	Cup	Flags
1	2	
2	1	
3	1	
B	0	BL
B	0	BL
6	1	
7	2	
8	1	LO
B	0	BL
10	2	
11	1	LO
12	3	
13	31	
14	32	
15	33	
16	34	
17	35	
18	36	
19	37	
20	38	
21	39	
	40	
23	3	
24	1	LO
B	0	BL
26	41	
27	42	
28	43	
29	44	
30	45	
31	46	
32	47	
33	48	
34	49	
35	50	
36	3	
37	1	LO
B	0	BL
39	51	
40	52	
41	53	
42	54	
43	55	
44	56	
45	57	
46	58	
47	59	
48	60	
49	3	
50	1	LO
B	0	BL

000063


Absorbance (µAu) (E+06)
-0.500
-0.400
-0.300
-0.200
-0.100
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500
1.600
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Time (sec)
Channel 2: ammonia
Sync: 4.89892
Carryover: 0.0142808
Carryover: -0.00270501
Baseline: -0.00332654
Baseline: -0.00332654
Cal 0: 0.00332602
Cal 1: 10
Blank: -0.00952075
Baseline: -0.00332654
ICV: 4.88812
CB: -0.00493335
12031 DAY28: 0.026174
12032 DAY28: 0.0231875
12033 DAY28: 0.0258952
12034 DAY28: 0.0198308
12035 DAY28: 0.0197056
10546 DAY0: 1.1392
10547 DAY0: 4.48106
10548 DAY0: 3.46803
10549 DAY0: 1.62329
10550 DAY0: 2.78291
CCV: 4.88645
CCB: -0.00166231
Baseline: -0.00332654
10551 DAY0: 1.66189
10552 DAY0: 0.171191
12664 DAY0: -0.00981249
12665 DAY0: 3.39067
12666 DAY0: 2.22077
12668 DAY0: 0.21227
12671 DAY0: 0.709502
10589 DAY0: 0.355618
10590 DAY0: 0.505543
10591 DAY0: 0.329983
CCV: 4.88446
CCB: 0.00340499
Baseline: -0.00332654
10592 DAY0: 0.945034
10593 DAY0: 2.40358
10609 DAY0: 0.304225
10610 DAY0: 0.87684
10615 DAY0: 0.127849
12611 DAY0: 4.32678
12612 DAY0: 0.712516
12613 DAY0: 0.855326
12614 DAY0: 1.22757
12622 DAY0: 0.194497
CCV: 4.85443
CCB: -0.0016919
Baseline: -0.00332654
12638 DAY0: 1.20374
12639 DAY0: 0.787281
12640 DAY0: 0.634042
12641 DAY0: 2.65878
CCV: 4.85972
CCB: 0.0034922
Baseline: -0.00332654
Hyalella azteca
Acute Tests
Day 0
10/10/99

000064

Peak Table: ammonia

File name: C:\FLOW_4\101299F.RST
Date: October 12, 1999
Operator: NTW

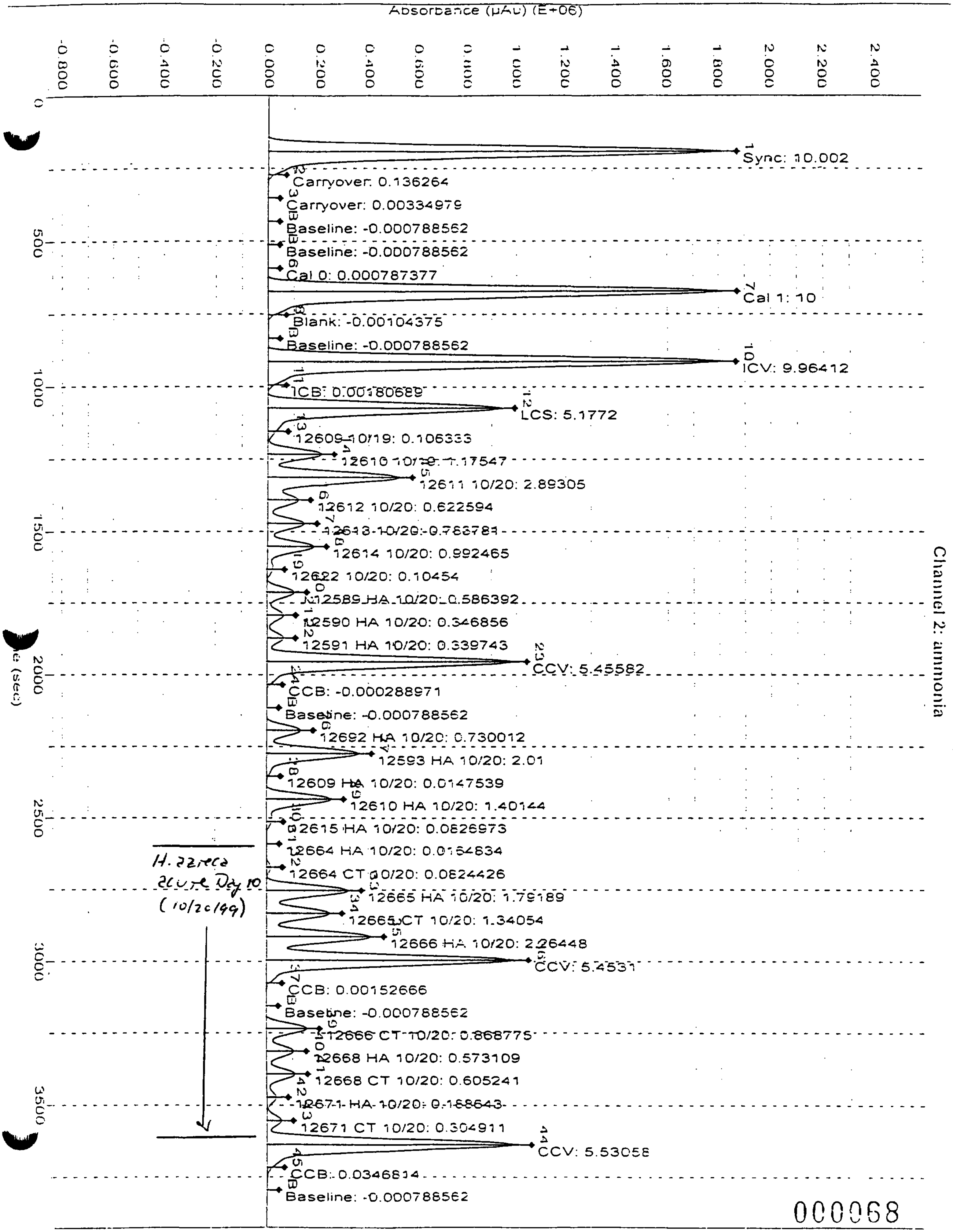
Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	3	Sync	SYNC	1	1	564454	4.898925
2	0	Carryover	CO	1	1	2027	0.014281
3	0	Carryover	CO	1	1	72	-0.002705
B	0	Baseline	RB	1	1	0	-0.003327
B	0	Baseline	RB	1	1	0	-0.003327
6	1	Cal 0	C	1	1	766	0.003326
7	2	Cal 1	C	1	1	1151801	10.000001
8	0	Blank	U	1	1	-713	-0.009521
B	0	Baseline	RB	1	1	0	-0.003327
10	3	ICV	U	1	1	563210	4.888124
11	1	ICB	U	1	1	-185	-0.004933
12	61	12031 DAY28	U	1	1	3397	0.026174
13	62	12032 DAY28	U	1	1	3053	0.023187
14	63	12033 DAY28	U	1	1	3365	0.025895
15	64	12034 DAY28	U	1	1	2666	0.019831
16	65	12035 DAY28	U	1	1	2652	0.019706
17	66	10546 DAY0	U	1	1	131553	1.139205
18	67	10547 DAY0	U	1	1	516340	4.481058
19	68	10548 DAY0	U	1	1	399699	3.468033
20	69	10549 DAY0	U	1	1	187292	1.623291
21	70	10550 DAY0	U	1	1	320812	2.782907
22	3	CCV	U	1	1	563248	4.888451
23	1	CCB	U	1	1	192	-0.001662
B	0	Baseline	RB	1	1	0	-0.003327
25	71	10551 DAY0	U	1	1	191736	1.661889
26	72	10552 DAY0	U	1	1	20094	0.171191
27	73	12664 DAY0	U	1	1	-655	-0.009012
28	74	12665 DAY0	U	1	1	390790	3.390665
29	75	12666 DAY0	U	1	1	256086	2.220768
30	76	12668 DAY0	U	1	1	24824	0.212270
31	77	12671 DAY0	U	1	1	82076	0.709502
32	78	10589 DAY0	U	1	1	41329	0.355618
33	79	10590 DAY0	U	1	1	58592	0.505543
34	80	10591 DAY0	U	1	1	38378	0.329983
35	3	CCV	U	1	1	562789	4.884464
36	1	CCB	U	1	1	775	0.003405
B	0	Baseline	RB	1	1	0	-0.003327
38	81	10592 DAY0	U	1	1	109196	0.945034
39	82	10593 DAY0	U	1	1	242593	2.103578
40	83	10609 DAY0	U	1	1	35412	0.304225
41	84	10610 DAY0	U	1	1	101344	0.876840
42	85	10615 DAY0	U	1	1	15104	0.127849
43	86	12611 DAY0	U	1	1	498576	4.326778
44	87	12612 DAY0	U	1	1	82423	0.712516
45	88	12613 DAY0	U	1	1	98867	0.855326
46	89	12614 DAY0	U	1	1	141727	1.227565
47	90	12622 DAY0	U	1	1	22778	0.194497
48	3	CCV	U	1	1	559331	4.854431
49	1	CCB	U	1	1	185	-0.001692
B	0	Baseline	RB	1	1	0	-0.003327
51	91	12638 DAY0	U	1	1	138983	1.203735
52	92	12639 DAY0	U	1	1	91032	0.787281
53	93	12640 DAY0	U	1	1	73388	0.634042
54	94	12641 DAY0	U	1	1	306520	2.658778

000065

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
55	3	CCV	U	1	1	559940	4.859718
56	1	CCB	U	1	1	785	0.003492
B	0	Baseline	RB	1	1	0	-0.003327

Peak	Cup	Flags
1	3	
2	0	
3	0	LO
B	0	BL
B	0	BL
6	1	
7	2	
8	0	LO
B	0	BL
10	3	
11	1	LO
12	61	
13	62	
14	63	
15	64	
16	65	
17	66	
18	67	
19	68	
20	69	
[illegible]	70	
[illegible]	3	
23	1	LO
B	0	BL
25	71	
26	72	
27	73	LO
28	74	
29	75	
30	76	
31	77	
32	78	
33	79	
34	80	
35	3	
36	1	
B	0	BL
38	81	
39	82	
40	83	
41	84	
42	85	
43	86	
44	87	
45	88	
46	89	
[illegible]	90	
[illegible]	3	
49	1	LO
B	0	BL
51	91	

000066


Absorbance (µAu) (E+06)
-0.800 -0.600 -0.400 -0.200 0.000 0.200 0.400 0.600 0.800 1.000 1.200 1.400 1.600 1.800 2.000 2.200 2.400
0 500 1000 1500 2000 2500 3000 3500
Time (sec)
Channel 2: ammonia
1 Sync: 10.002
2 Carryover: 0.136264
3 Carryover: 0.00334979
B Baseline: -0.000788562
B Baseline: -0.000788562
6 Cal 0: 0.000787377
7 Cal 1: 10
8 Blank: -0.00104375
B Baseline: -0.000788562
10 ICV: 9.96412
11 ICB: 0.00180689
12 LCS: 5.1772
13 12609 10/19: 0.106333
14 12610 10/19: 1.17547
15 12611 10/20: 2.89305
16 12612 10/20: 0.622594
17 12613 10/20: 0.783781
18 12614 10/20: 0.992465
19 12622 10/20: 0.10454
20 12589 HA 10/20: 0.586392
21 12590 HA 10/20: 0.346856
22 12591 HA 10/20: 0.339743
23 CCV: 5.45582
24 CCB: -0.000288971
B Baseline: -0.000788562
26 12692 HA 10/20: 0.730012
27 12593 HA 10/20: 2.01
28 12609 HA 10/20: 0.0147539
29 12610 HA 10/20: 1.40144
30 12615 HA 10/20: 0.0826973
31 12664 HA 10/20: 0.0164834
32 12664 CT 10/20: 0.0824426
33 12665 HA 10/20: 1.79189
34 12665 CT 10/20: 1.34054
35 12666 HA 10/20: 2.26448
36 CCV: 5.4531
37 CCB: 0.00152666
B Baseline: -0.000788562
39 12666 CT 10/20: 0.868775
40 12668 HA 10/20: 0.573109
41 12668 CT 10/20: 0.605241
42 12671 HA 10/20: 0.168643
43 12671 CT 10/20: 0.304911
44 CCV: 5.53058
45 CCB: 0.0346814
B Baseline: -0.000788562
H. azteca
acute Day 10
(10/20/99)

000068

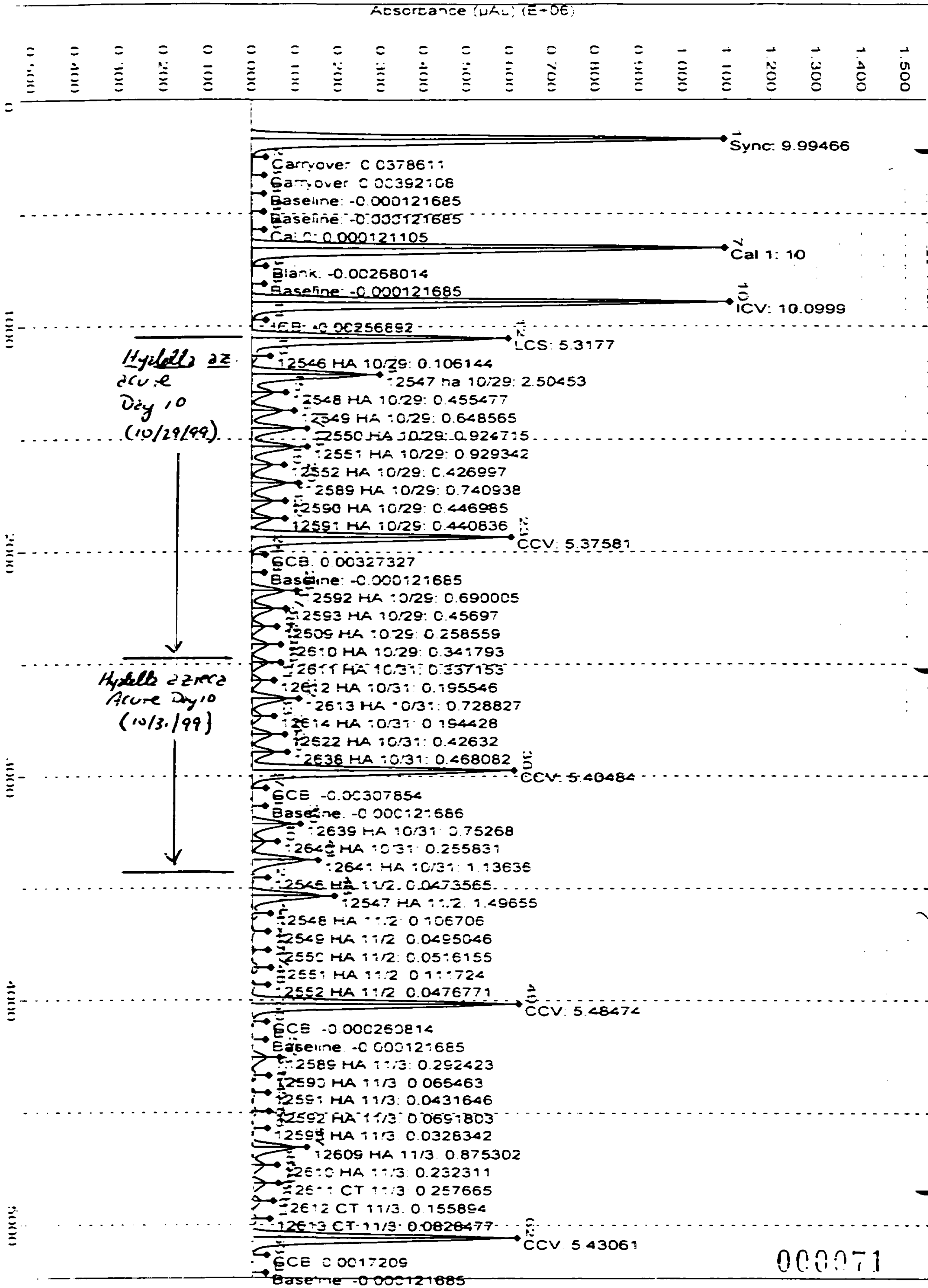
Peak Table: ammonia

File name: E: FLOW_4\102799E.RST
Date: October 28, 1999
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1827617	10.001991
2	0	Carryover	CO	1	1	25041	0.136264
3	0	Carryover	CO	1	1	756	0.003350
B	0	Baseline	RB	1	1	0	-0.000789
B	0	Baseline	RB	1	1	0	-0.000789
6	1	Cal 0	C	1	1	288	0.000787
7	2	Cal 1	C	1	1	1827253	10.000001
8	0	Blank	U	1	1	-47	-0.001044
B	0	Baseline	RB	1	1	0	-0.000789
10	2	ICV	U	1	1	1820698	9.964125
11	1	ICB	U	1	1	474	0.001807
12	3	LCS	U	1	1	946075	5.177200
13	61	12609 10/19	U	1	1	19572	0.106333
14	62	12610 10/19	U	1	1	214916	1.175473
15	63	12611 10/20	U	1	1	528736	2.893049
16	64	12612 10/20	U	1	1	113899	0.622594
17	65	12613 10/20	U	1	1	143349	0.783781
18	66	12614 10/20	U	1	1	181478	0.992465
19	67	12622 10/20	U	1	1	19245	0.104540
20	68	12589 HA 10/20	U	1	1	107284	0.586392
21	69	12590 HA 10/20	U	1	1	63518	0.346856
22	70	12591 HA 10/20	U	1	1	62219	0.339743
23	3	CCV	U	1	1	996983	5.455823
24	1	CCB	U	1	1	91	-0.000289
B	0	Baseline	RB	1	1	0	-0.000789
26	71	12592 HA 10/20	U	1	1	133525	0.730012
27	72	12593 HA 10/20	U	1	1	367392	2.009997
28	73	12609 HA 10/20	U	1	1	2840	0.014754
29	74	12610 HA 10/20	U	1	1	256203	1.401440
30	75	12615 HA 10/20	U	1	1	15254	0.082697
31	76	12664 HA 10/20	U	1	1	3156	0.016483
32	77	12664 CT 10/20	U	1	1	15207	0.082443
33	78	12665 HA 10/20	U	1	1	327542	1.791890
34	79	12665 CT 10/20	U	1	1	245075	1.340539
35	80	12666 HA 10/20	U	1	1	413889	2.264477
36	3	CCV	U	1	1	996484	5.453096
37	1	CCB	U	1	1	423	0.001527
B	0	Baseline	RB	1	1	0	-0.000789
39	81	12666 CT 10/20	U	1	1	158879	0.868775
40	82	12668 HA 10/20	U	1	1	104857	0.573109
41	83	12668 CT 10/20	U	1	1	110728	0.605241
42	84	12671 HA 10/20	U	1	1	34611	0.188643
43	85	12671 CT 10/20	U	1	1	55855	0.304911
44	3	CCV	U	1	1	1010641	5.530580
45	1	CCB	U	1	1	6481	0.034681
B	0	Baseline	RB	1	1	0	-0.000789

Peak	Cup	Flags
1	2	
2	0	
3	0	

Peak	Cup	Flags
B	0	BL
B	0	BL
6	1	
[illegible]	2	
[illegible]	0	LO
B	0	BL
10	2	
11	1	
12	3	
13	61	
14	62	
15	63	
16	64	
17	65	
18	66	
19	67	
20	68	
21	69	
22	70	
23	3	
24	1	LO
B	0	BL
26	71	
27	72	
28	73	
29	74	
30	75	
31	76	
[illegible]	77	
[illegible]	78	
34	79	
35	80	
36	3	
37	1	
B	0	BL
39	81	
40	82	
41	83	
42	84	
43	85	
44	3	
45	1	
B	0	BL


Absorbance (µAU) (E+06)
0.500 0.400 0.300 0.200 0.100 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.100 1.200 1.300 1.400 1.500
Time (sec)
0
1000
2000
3000
4000
5000
Sync: 9.99466
Carryover: 0.0378611
Carryover: 0.00392106
Baseline: -0.000121685
Baseline: -0.000121685
Cal 0: 0.000121105
Cal 1: 10
Blank: -0.00268014
Baseline: -0.000121685
ICV: 10.0999
ICB: -0.00256892
LCS: 5.3177
12546 HA 10/29: 0.106144
12547 ha 10/29: 2.50453
12548 HA 10/29: 0.455477
12549 HA 10/29: 0.648565
12550 HA 10/29: 0.924715
12551 HA 10/29: 0.929342
12552 HA 10/29: 0.426997
12589 HA 10/29: 0.740938
12590 HA 10/29: 0.446985
12591 HA 10/29: 0.440836
CCV: 5.37581
CCB: 0.00327327
Baseline: -0.000121685
12592 HA 10/29: 0.690005
12593 HA 10/29: 0.45697
12609 HA 10/29: 0.258559
12610 HA 10/29: 0.341793
12611 HA 10/31: 0.337153
12612 HA 10/31: 0.195546
12613 HA 10/31: 0.728827
12614 HA 10/31: 0.194428
12622 HA 10/31: 0.42632
12638 HA 10/31: 0.468082
CCV: 5.40484
CCB: -0.00307854
Baseline: -0.000121686
12639 HA 10/31: 0.75268
12640 HA 10/31: 0.255831
12641 HA 10/31: 1.13636
12546 HA 11/2: 0.0473565
12547 HA 11/2: 1.49655
12548 HA 11/2: 0.106706
12549 HA 11/2: 0.0495046
12550 HA 11/2: 0.0516155
12551 HA 11/2: 0.111724
12552 HA 11/2: 0.0476771
CCV: 5.48474
CCB: -0.000260814
Baseline: -0.000121685
12589 HA 11/3: 0.292423
12590 HA 11/3: 0.066463
12591 HA 11/3: 0.0431646
12592 HA 11/3: 0.0691803
12593 HA 11/3: 0.0328342
12609 HA 11/3: 0.875302
12610 HA 11/3: 0.232311
12611 CT 11/3: 0.257665
12612 CT 11/3: 0.155894
12613 CT 11/3: 0.0828477
CCV: 5.43061
CCB: 0.0017209
Baseline: -0.000121685
Hyalella az acute Day 10 (10/29/99)
Hyalella azteca Acute Day 10 (10/31/99)
Channel ammonia

000071

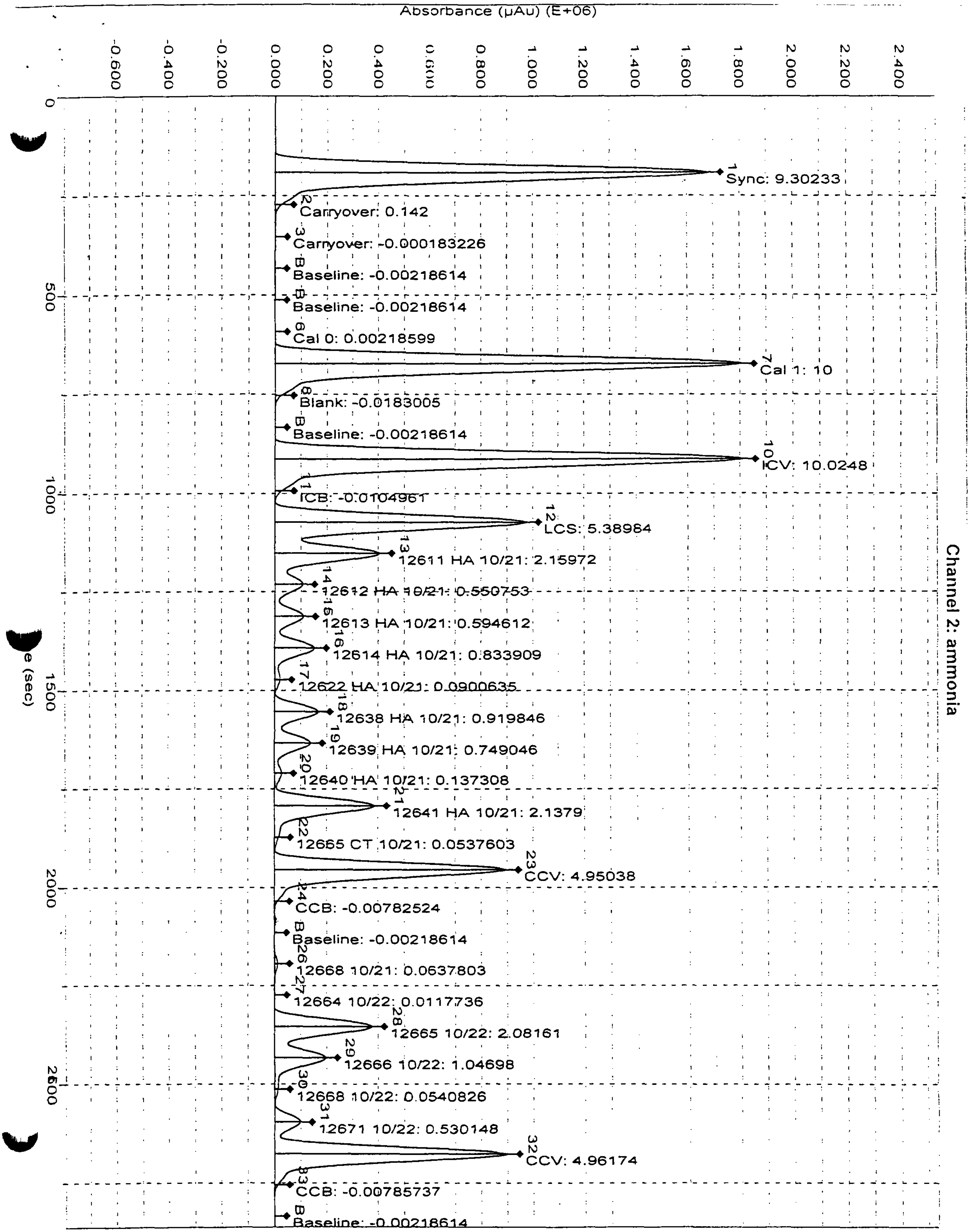
Peak Table: ammonia

File name: E:\FLOW_4\112399A.RST
Date: November 23, 1999
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1064292	9.994657
2	0	Carryover	CO	1	1	4045	0.037861
3	0	Carryover	CO	1	1	430	0.003921
B	0	Baseline	RB	1	1	0	-0.000122
B	0	Baseline	RB	1	1	0	-0.000122
6	1	Cal 0	C	1	1	26	0.000121
7	2	Cal 1	C	1	1	1064860	10.000000
8	0	Blank	U	1	1	-272	-0.002680
B	0	Baseline	RB	1	1	0	-0.000122
10	2	ICV	U	1	1	1075499	10.099907
11	1	ICB	U	1	1	-261	-0.002569
12	3	LCS	U	1	1	566267	5.317698
13	31	12546 HA 10/29	U	1	1	11316	0.106144
14	32	12547 ha 10/29	U	1	1	266707	2.504527
15	33	12548 HA 10/29	U	1	1	48514	0.455477
16	34	12549 HA 10/29	U	1	1	69075	0.648565
17	35	12550 HA 10/29	U	1	1	98481	0.924715
18	36	12551 HA 10/29	U	1	1	98974	0.929342
19	37	12552 HA 10/29	U	1	1	45482	0.426997
20	38	12589 HA 10/29	U	1	1	78912	0.740938
21	39	12590 HA 10/29	U	1	1	47610	0.446985
22	40	12591 HA 10/29	U	1	1	46955	0.440836
23	3	CCV	U	1	1	572454	5.375807
	1	CCB	U	1	1	362	0.003273
	0	Baseline	RB	1	1	0	-0.000122
26	41	12592 HA 10/29	U	1	1	73488	0.690005
27	42	12593 HA 10/29	U	1	1	48673	0.456970
28	43	12609 HA 10/29	U	1	1	27546	0.258559
29	44	12610 HA 10/29	U	1	1	36409	0.341793
30	45	12611 HA 10/31	U	1	1	35915	0.337153
31	46	12612 HA 10/31	U	1	1	20836	0.195546
32	47	12613 HA 10/31	U	1	1	77622	0.728827
33	48	12614 HA 10/31	U	1	1	20717	0.194428
34	49	12622 HA 10/31	U	1	1	45410	0.426320
35	50	12638 HA 10/31	U	1	1	49857	0.468082
36	3	CCV	U	1	1	575546	5.404839
37	1	CCB	U	1	1	-315	-0.003079
B	0	Baseline	RB	1	1	0	-0.000122
39	51	12639 HA 10/31	U	1	1	80162	0.752680
40	52	12640 HA 10/31	U	1	1	27255	0.255831
41	53	12641 HA 10/31	U	1	1	121018	1.136359
42	54	12546 HA 11/2	U	1	1	5056	0.047356
43	55	12547 HA 11/2	U	1	1	159373	1.496553
44	56	12548 HA 11/2	U	1	1	11375	0.106706
45	57	12549 HA 11/2	U	1	1	5284	0.049505
46	58	12550 HA 11/2	U	1	1	5509	0.051615
47	59	12551 HA 11/2	U	1	1	11910	0.111724
48	60	12552 HA 11/2	U	1	1	5090	0.047677
49	3	CCV	U	1	1	584054	5.484735
	1	CCB	U	1	1	-15	-0.000261
B	0	Baseline	RB	1	1	0	-0.000122
52	61	12589 HA 11/3	U	1	1	31152	0.292423
53	62	12590 HA 11/3	U	1	1	7090	0.066463
54	63	12591 HA 11/3	U	1	1	4609	0.043165

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
55	64	12592 HA 11/3	U	1	1	7360	0.069180
56	65	12593 HA 11/3	U	1	1	3509	0.032834
57	66	12609 HA 11/3	U	1	1	93219	0.875302
58	67	12610 HA 11/3	U	1	1	24751	0.232311
59	68	12611 CT 11/3	U	1	1	27450	0.257665
60	69	12612 CT 11/3	U	1	1	16613	0.155894
61	70	12613 CT 11/3	U	1	1	8835	0.082848
62	3	CCV	U	1	1	578290	5.430609
63	1	CCB	U	1	1	196	0.001721
B	0	Baseline	RB	1	1	0	-0.000122

Peak	Cup	Flags
1	2	
2	0	
3	0	
B	0	BL
B	0	BL
6	1	
7	2	
8	1	LO
B	0	BL
10	2	
11	1	LO
12	3	
13	31	
14	32	
15	33	
16	34	
17	35	
18	36	
19	37	
20	38	
21	39	
22	40	
23	3	
24	1	
B	0	BL
26	41	
27	42	
28	43	
29	44	
30	45	
31	46	
32	47	
33	48	
34	49	
35	50	
36	3	
37	1	LO
B	0	BL
39	51	
40	52	
41	53	
42	54	
43	55	
44	56	


Absorbance (µAu) (E+06)
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Channel 2: ammonia
0
500
1000
1500
2000
2500
e (sec)
1 Sync: 9.30233
2 Carryover: 0.142
3 Carryover: -0.000183226
B Baseline: -0.00218614
B Baseline: -0.00218614
6 Cal 0: 0.00218599
7 Cal 1: 10
8 Blank: -0.0183005
B Baseline: -0.00218614
10 ICV: 10.0248
11 ICB: -0.0104961
12 LCS: 5.38984
13 12611 HA 10/21: 2.15972
14 12612 HA 10/21: 0.550753
15 12613 HA 10/21: 0.594612
16 12614 HA 10/21: 0.833909
17 12622 HA 10/21: 0.0900635
18 12638 HA 10/21: 0.919846
19 12639 HA 10/21: 0.749046
20 12640 HA 10/21: 0.137308
21 12641 HA 10/21: 2.1379
22 12665 CT 10/21: 0.0537603
23 CCV: 4.95038
24 CCB: -0.00782524
B Baseline: -0.00218614
26 12668 10/21: 0.0637803
27 12664 10/22: 0.0117736
28 12665 10/22: 2.08161
29 12666 10/22: 1.04698
30 12668 10/22: 0.0540826
31 12671 10/22: 0.530148
32 CCV: 4.96174
33 CCB: -0.00785737
B Baseline: -0.00218614

Peak Table: ammonia

File name: F:\FLOW_4\102799F.RST
Date: October 28, 1999
Operator: NWW

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1683774	9.302330
2	0	Carryover	CO	1	1	26092	0.142000
3	0	Carryover	CO	1	1	362	-0.000183
B	0	Baseline	RB	1	1	0	-0.002186
B	0	Baseline	RB	1	1	0	-0.002186
6	1	Cal 0	C	1	1	791	0.002186
7	2	Cal 1	C	1	1	1810026	10.000000
8	0	Blank	U	1	1	-2916	-0.018301
B	0	Baseline	RB	1	1	0	-0.002186
10	2	ICV	U	1	1	1814510	10.024775
11	1	ICB	U	1	1	-1504	-0.010496
12	3	LCS	U	1	1	975757	5.389835
13	91	12611 HA 10/21	U	1	1	391225	2.159720
14	92	12612 HA 10/21	U	1	1	100062	0.550753
15	93	12613 HA 10/21	U	1	1	107998	0.594612
16	94	12614 HA 10/21	U	1	1	151302	0.833909
17	95	12622 HA 10/21	U	1	1	16694	0.090064
18	96	12638 HA 10/21	U	1	1	166854	0.919846
19	97	12639 HA 10/21	U	1	1	135945	0.749046
20	98	12640 HA 10/21	U	1	1	25243	0.137308
21	99	12641 HA 10/21	U	1	1	387277	2.137903
22	100	12665 CT 10/21	U	1	1	10124	0.053760
23	3	CCV	U	1	1	896232	4.950380
24	1	CCB	U	1	1	-1020	-0.007825
B	0	Baseline	RB	1	1	0	-0.002186
26	101	12668 10/21	U	1	1	11937	0.063780
27	102	12664 10/22	U	1	1	2526	0.011774
28	103	12665 10/22	U	1	1	377090	2.081606
29	104	12666 10/22	U	1	1	189860	1.046979
30	105	12668 10/22	U	1	1	10183	0.054083
31	106	12671 10/22	U	1	1	96333	0.530148
32	3	CCV	U	1	1	898288	4.961744
33	1	CCB	U	1	1	-1026	-0.007857
B	0	Baseline	RB	1	1	0	-0.002186

Peak	Cup	Flags
1	2	
2	0	
3	0	LO
B	0	BL
B	0	BL
6	1	
7	2	
8	0	LO
B	0	BL
10	2	
11	1	LO
12	3	
13	91	
14	92	
15	93	

Peak	Cup	Flags
16	94	
17	95	
18	96	
19	97	
20	98	
21	99	
22	100	
23	3	
24	1	LO
B	0	BL
26	101	
27	102	
28	103	
29	104	
30	105	
31	106	
32	3	
33	1	LO
B	0	BL

3/5
10/12/99

#	ABS Sample ID		NVW <0.5	JWW <0.5
1.	1Ø589 (2 above Ø)	Ø	Y	Y
2.	590	Ø		
3.	591	Ø		
4.	592	Ø		
5.	593	Ø		
6.	10609	Ø		
7.	10610	Ø		
8.	10615	Ø		
9.	12611	Ø		
10.	612	Ø		
11.	613	Ø		
12.	614	Ø		
13	12622	Ø		
14	12638	Ø		
15	12639	Ø		
16	12640	Ø		
17	12641	Ø		
18.	12546 FW			
19.	547 FW			
20.	548 FW			

NVW
10/12

JWW 10/12/99

	NVW	JWW
	<0.5 ppms =	<0.5 ppms =
1. 12549 PW		
2. 550 PW		
3. RHF 12 551 PW		
4. 10 589 PW		
5. 590 PW		
6. 591 PW		
7. 592 PW		
8. 593 PW		
9. 10609 PW		
10. 12610 PW		
11. 611 PW		
12. 612 PW		
13. 613 PW		
14. 614 PW		
15. 12638 PW		
16. 639 PW		
17. 640 PW		
18. 641 PW		
19. 12666 PW		
20.* 12666 PW	N	N
	NVW 10/12/99	JWW 10/12/99

* 5.0 ppm MS

#	ABS Sample ID		NVW <0.5 ppm	JWW <0.5
1	12664	PW	Y	Y
2	RHB 65	PW		
3	12671	PW		
4	10546	∅		
5	10547	∅		
6	10548	∅		
7	10549	∅		
8	550	∅		
9	10551	∅		
10	552	∅		
11	12664	∅		
12	665	∅		
13	666	∅		
14	668	∅		
15	671	∅		

NVW 10/12/99

10/12/99

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3615

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/6/99 ✓ 10/18/99; ALL SAMPLES JG TM — Acute retests.
- *C. tentans* acute test: 10/6/99 ✓
- *H. azteca* chronic test: 10/18/99; ALL SAMPLES JG for LS
- *C. tentans* chronic test: 12548, 12550, 12551; 10/18/99 JG for LS

10/23/99 – Loaded sediments for ax males (12548, 12550, 12551, 12552, 12592, 12593, 12609) JW

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12546	6.9			Viscous mud, NO overlying water
12547	7.0			Liquid, fine mud. many freshwater gastropods
				removed visible gastropods 10/6 TM
12548	7.0			Liquid mud, gastropods present, removed those visible 10/6 TM
12549	7.0			Soft mud. pine needles, some overlying water
12550	7.0			soft mud with overlying water pine needles
12551	7.0			soft mud with overlying water
12552 LCS	TM 10/6/99			EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: TM Date: 10/6/99

Reviewer: [signature] Date: 12/7/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Sediment Characterization

Client: Menzie-Cura & Assoc. Project: 99033	BTR: 3622 / 3629

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/7/99 10/18/99 JG TM
- *C. tentans* acute test: 10/7/99
- *H. azteca* chronic test:
- *C. tentans* chronic test: 10/18/99 ; 12592, 12593, 12609 TM

*Sample 12592 sieved to remove indigenous chironimids (for C.t. only).

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12589	7.1			dk brown muddy sediment with sticks and vegetative material
12590	6.9			dk brown cohesive mud with veg. material
12591	6.9			brown mud with veg. material
* 12592	7.1			dk. brown mud with little veg. material
12593	7.0			black watery mud w/petroleum-like odor
12609	7.1			thick dk. brown cohesive mud with veg material
12610	7.2			dk brown very thick cohesive mud w/some veg. material
12615 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JJG Date: 10/7/99

Reviewer: J Date: 12/7/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3629 / 3633

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/8/99
- *C. tentans* acute test: 10/8/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12611	6.8			black mud w/leaf litter
12612	7.7			Fine Brown mud
12613	7.7			Soft Brown mud
12614	7.5			Soft Brown mud
12638	7.6			Soft Brown mud
12639	7.3			sticks + leaves on top + through out cohesive mud, dark
12640	7.2			sticks + leaf litter Dark thick mud
12641	7.2			Soft Brown mud
12622 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JJG Date: 10/8/99
Jm

Reviewer: _________ Date: _________

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3641

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/9/99
- *C. tentans* acute test: 10/9/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12664	7.8			fine cohesive mud.
12665	7.3			fine soft mud
12666	7.5			fine. Sticky/Cohesive mud
~~12667~~ JG 12671	7.4			fine; brown mud - chironomids present
12668 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JG Date: 10/9/99

Reviewer: [signature] Date 12/13/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Preparation of Formulated Control Sediment
for
Freshwater Sediment Toxicity Tests

Procedure based on EPA/600/R-94/024

Batch No. 10/4 Preparation Date: 10/4/99 Prepared by: JJG.

Ingredient	Amount (g)	Percent composition
Fine sand	1848	
Medium sand	924	77
Kaolinite clay	612	17
Blended and 0.~~3~~5 mm sieved Canadian sphagnum peat	180	5
CaCO3	36	1
Total	3600	100

Store well-mixed and dry in a sealed Rubbermaid box. Label by batch number. Store copy of this documentation in project file. Store original in Sed/Water preparation notebook.

Hydrate to a cohesive sediment consistency before use.

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of October 3, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• solicter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?		✓	✓	✓	✓	✓	✓

Test monitoring

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	✓
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓

Additional activities

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Corrective Action / Comments							
Initials/Date	JG 10/3	JG 10/4	JG 10/5	[illegible] 10/6	JG 10/7	[illegible] 10/8	JG 10/9

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer: [signature] Date: 12/8/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 10, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓	✓	✓	✓	✓	✓	✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	(*3) ✓	✓	✓
• check for floating organisms	(*1) ✓	(*2) ✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	TM JG 10/10	JG AM 10/11	JG 10/12 PM	TM 10/13	TM 10/14	JG 10/15	JG 10/16

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:
(*1) 12591 nearly all reps had floaters 10/10 TM squirted them down most seemed to be living
(*2) 12591 E,F,H had floaters 10/11/99 TM
(*3) 12666 Ha and C+. got an extra manual renewal 10/14 JGM AM PM

Reviewer J Date 12/8/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 17, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets? TWICE DAILY	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓ (1)	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	[illegible]	[illegible]	10/19	10/20	10/21	10/22	10/23

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments: (1) Chironomid test set ups were fed on Day -1 (day prior to organism addition) J 10/18/99

Exposure water for H.a. chronic = Lake/Recon mix.
Exposure water for C.T. chronic = Recon Water. J 10/22/99

Reviewer: J Date 12/8/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000087

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 24, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JG 10/24	TM 10/25	TM 10/26	TM JG 10/27	TM 10/28	JG 10/29	10/30 JG

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer [illegible] Date 12/8/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 31, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

Test monitoring

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	—	—	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓

Additional activities

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Corrective Action / Comments							
Initials/Date	JG 10/31	11/1 JG	11/2 m	11/3 m	11/4 m	JG 11/5	JG 11/6

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments: 11/5/99 (midnight) renewal missed. Renewal initiated at 09:20
"Noon" renewal conducted at 14:00 11/6 JG 11/6/99 JJG

Reviewer: J Date 12/8/99

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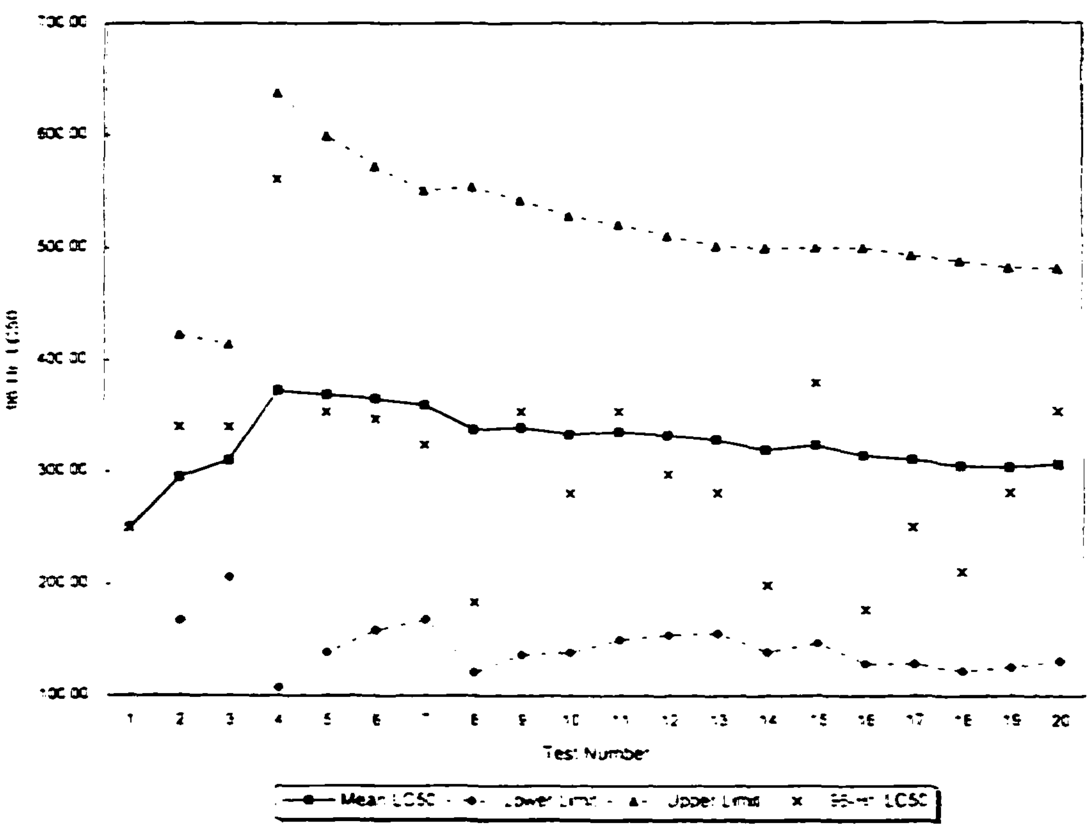
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

APPENDIX D

Reference Toxicant Control Chart
Hyalella azteca
in Potassium chloride (mg/L)

Test Number	Test Date	Organism Age (Days)	96-Hr. LC50	Mean LC50	Lower Limit	Upper Limit	Organism Source
1	12/20/97	10	250.000	250.00			Env. Consult & Testing
2	04/15/98	8	340.198	295.10	167.54	422.66	Env. Consult & Testing
3	04/17/98	10	340.198	310.13	205.98	414.28	Env. Consult & Testing
4	08/04/98	14	561.231	372.91	107.80	638.02	Env. Consult & Testing
5	08/22/98	10	353.553	369.04	138.79	599.28	Env. Consult & Testing
6	09/13/98	11	347.163	365.39	158.68	572.10	Env. Consult & Testing
7	10/26/98	12	324.210	359.51	168.26	550.76	Env. Consult & Testing
8	11/13/98	10	183.717	337.53	121.20	553.87	Env. Consult & Testing
9	02/19/99	9	353.553	339.31	136.67	541.95	Env. Consult & Testing
10	05/13/99	8	280.616	333.44	138.81	528.07	Env. Consult & Testing
11	06/21/99	12	353.553	335.27	150.23	520.31	Env. Consult & Testing
12	06/25/99	14	297.302	332.11	154.32	509.89	Env. Consult & Testing
13	06/26/99	10	280.616	328.15	155.55	500.74	Env. Consult & Testing
14	07/02/99	7	198.425	318.88	139.14	498.62	Env. Consult & Testing
15	07/07/99	8	378.929	322.55	146.93	498.84	Env. Consult & Testing
16	07/07/99	7	176.777	313.75	128.73	498.77	Aquatic Research Organisms
17	09/13/99	11	250.000	310.00	128.21	491.80	Aquatic Research Organisms
18	10/08/99	9	210.224	304.45	121.93	486.99	Aquatic Research Organisms
19	10/23/99	13	280.616	303.20	125.48	480.93	Aquatic Research Organisms
20	10/23/99	9	353.553	305.72	131.28	480.17	Aquatic Research Organisms



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000090

Hyalella azteca Chronic Survival, Growth and Reproduction Toxicity Tests Conducted on Sediment Samples from the Solutia Site, Sauget , Illinois

Reference BTRs 3615, 3622, 3629, 3633, 3641, 3643

Prepared for:
Menzie-Cura & Associates
1 Courthouse Lane, Suite 2
Chelmsford, MA 01824

Aquatec Biological Sciences

Prepared by:
Aquatec Biological Sciences
75 Green Mountain Drive
South Burlington, Vermont

December 1999

D

Aquatec Biological Sciences

Ecology · Environmental Toxicology · Natural Resource Assessments · Microbiology

BTRS 3615, 3622, 3629, 3633, 3641, 3643

PROJECT: 99033

I have reviewed this data package. which was completed under my supervision. This data package is complete. and to the best of my ability. accurately reflects the conditions and the results of the reported tests.

John W. Williams
Toxicity Laboratory Manager

12/23/99
Date

I have reviewed and discussed this data package with the responsible laboratory manager. Based on this review. the data package was. to the best of my knowledge and belief, conducted in accordance with established company quality assurance procedures.

Philip C. Downey
Philip C. Downey. Ph.D.
Director

12/23/99
Date

75 Green Mountain Drive. South Burlington. Vt 05403 Tel: 802.860.1638 Fax: 802.658.3189

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LIST OF APPENDICES

EXECUTIVE SUMMARY

100.1HA Amphipod, *Hyalella azteca*, 42-day Chronic Survival, Growth, and Reproduction Test
Conducted October 19 - December 3, 1999
for Menzie-Cura & Associates
Solutia Site, Sauget Illinois

Lab Test ID	Sample ID	Day 28 Mean Survival (%)	Day 28 Mean Dry Weight (mg)	Day 35 Mean Survival (%)	Day 42 Mean Survival (%)	Day 42 Mean Dry Weight (mg)	Day 42 Mean Number of Neonates/ Female
12546	BTOX-C-1	93	0.766	92	87	0.510	11.5
12547	BTOX-C-2	88	0.456	76	73	0.489	3.7
12548	BTOX-C-3	90	0.656	80	76	0.402	3.3
12549	BTOX-D-1	89	0.571	85	84	0.414	5.1
12550	BTOX-D-2	87	0.684	85	81	0.428	4.0
12551	BTOX-D-3	80	0.731	79	79	0.400	3.5
12552	Laboratory Control	55	0.982	51	46	0.231	0.6
12589	BTOX-B-1	23*	--	8*	8*	--	--
12590	BTOX-B-1 (Dup)	22*	--	26*	26*	--	--
12591	BTOX-B-2	Acute Toxicity		--	--	--	--
12592	BTOX-B-3	49*	--	40*	39*	--	--
12593	BTOX-B-M	88	0.481	89	85	0.348	1.6
12609	E-1 Dead Creek	72*	--	63*	56*	--	--
12610	E-2 Dead Creek	97	0.612	94	91	0.462	4.6
12611	E-3 Dead Creek	67*	--	53	50*	--	--
12612	BP-1 Borrow Pit	93	0.594	88	83	0.380	4.1
12613	BP-1 (Dup) Borrow Pit	89	0.636	80	75	0.423	4.2
12614	BP-3 Borrow Pit	95	0.470	86	84	0.322	5.3
12615	Laboratory Control	62	0.296	36	33	0.299	1.8
12622	Laboratory Control	55	0.501	38	35	0.377	4.0
12638	BP-2 Borrow Pit	82	0.563	74	73	0.390	4.3
12639	F1 Dead Creek	91	0.639	89	84	0.397	4.8
12640	F2 Dead Creek	90	0.554	74	70	0.447	3.8
12641	F3 Dead Creek	89	0.661	85	76	0.406	4.8
12664	Prairie DuPont	90	0.443	83	79	0.346	2.6
12665	Praire Dupont 2	89	0.648	85	80	0.498	6.2
12666	Reference Creek	70*	--	64	65	0.459	2.3
12668	Laboratory Control	73	0.477	65	59	0.293	2.2
12671	Ref 2-2 Ref Borrow Pit	87	0.458	85	83	0.351	3.4

* A statistically significant reduction in the response was observed (relative to a corresponding Reference Site response. $P<0.05$)

-- When a significant reduction in survival on Days 28 or 42 was detected, mean dry weight and reproduction data were only reported in Appendix A (See Results)

INTRODUCTION:

Samples were received for toxicity testing at Aquatec Biological Sciences of 75 Green Mountain Drive, South Burlington, Vermont. The results of the following tests are reported:

Client:	Menzie-Cura & Associates
Facility/Location:	Dead Creek / Sauget, Illinois
Initial Sampling Date:	October 4 - October 9, 1999
Testing Dates:	October 19 - December 3, 1999
Tests Conducted:	Amphipod, *Hyalella azteca* , Chronic 42-day Survival, Growth, and Reproduction

METHODS:

Toxicity Tests

The procedures followed in conducting these toxicity tests were based on draft methods described by the USEPA (EPA 600/R-98/XXX [new number pending]). Test conditions for *Hyalella azteca* are listed in Table 1. Testing was completed in four separate groupings based upon chronological sequencing from the time of sediment collection. The objective for the test groupings was to complete the 10-day acute tests prior to expiration of a project-specific 14-day sediment storage time so that subsequent chronic toxicity tests could be started within a 14-day time frame. The acute toxicity results were reported separately (Aquatec Biological Sciences, December 1999).

Sediments were loaded into beakers for chronic testing within one day after completion of the acute toxicity tests, therefore, the objective of starting all tests within 14-days from the time of collection was accomplished for all samples. Chronic toxicity testing with *Hyalella azteca* was initiated for all samples received because some acute toxicity retests were also being started concurrently. Chronic toxicity testing for the first testing group was initiated on October 19, 1999. The second testing group was initiated on October 20, 1999. The third testing group was initiated on October 21, 1999. The fourth testing group was initiated on October 22, 1999. After the conclusion of the acute retests, chronic testing of Sample 12591 was suspended on Day 16 because acute toxicity was confirmed and then verified by examination of several replicates from the chronic test replicates.

A laboratory control (artificial sediment) was included with each testing group. Amphipods, seven days old. obtained from Aquatic Research Organisms were used for chronic toxicity tests.

Test organisms were exposed for 28 days to sediment samples. On Day 28, surviving amphipods were assessed for survival (all replicates) and growth (by dry weight. four replicates). Organisms from eight replicates were shifted to water only exposure for subsequent survival, growth, and reproduction (neonate production) assessment.

Chronic toxicity tests were ended on Day 42. Overlying water was renewed either automatically or manually. For those samples/replicates renewed automatically. the renewal cycle was programmed for midnight and noon of each day. For samples/replicates renewed manually, the renewal cycle was performed at approximately 7:00 a.m. and 7:00 p.m. daily. Documentation of renewals and renewal system checks is located in Appendix C. At the conclusion of the sediment exposure any additional amphipods recovered during Quality Assurance repicks were included in the Day 28 replicate survival assessment. but were not included in the replicate growth assessment.

Sediment Preparation

The samples were stored refrigerated and in the dark whenever they were not being used in preparation for testing. Sediments distributed in test beakers were examined for the presence of indigenous organisms that were removed when observed. Also. large pieces of vegetative material (e.g.. leaf litter, sticks. grass) were removed if observed. Qualitative observations regarding the sediment type and indigenous organisms removed were recorded. The laboratory control sediment (artificial sediment) was prepared following formulations specified in the USEPA protocols and then hydrated prior to distribution to test chambers. Sediments were then distributed to individual replicate test chambers. overlying water was added. and the overlying water renewal system was activated. The unused portion of each sample (in the original sample container) was returned to refrigerated storage.

Statistical Analyses

Laboratory Control survival was variable and generally below the 28-day draft protocol target limits (This variability may reflect limitations of the USEPA recommended sediment formulation for adequately supporting *Hyalella azteca* survival and growth over extended periods of time.). Statistical comparisons were made against appropriate reference sites since this evaluation would provide more relevant biological comparisons.

Survival of the original amphipods and production of neonates was evaluated on Days 35 and 42. On the Day 35 assessment, the number of original amphipods were counted (alive) in the test beakers while the neonates were removed for enumeration. On Day 42 the original amphipods were removed and weighed, while the additional neonates produced were enumerated. Occasionally, the number of original amphipods counted on Day 35 was lower than those counted on Day 42, due in a large part to underestimation of Day 35 original amphipods associated with the variability of counting live swimming organisms. Statistical analysis of the Day 35 survival data was conducted on the observed counts.

Test data were evaluated for normality and equality of variance and the grouped data (See Results for statistical groupings.) were tested by appropriate parametric or non-parametric multiple comparison statistical tests to identify significant reductions in the response relative to the site-specific reference sample. Proportion surviving data were transformed (Arcsin square-root) before analysis. Statistical significance for any sample was based upon the most sensitive endpoint observed.

PROTOCOL DEVIATIONS:

Several test replicates were excluded from the data tabulations and statistical analysis because of apparent discrepancies in the number of test organisms allocated to these replicates. The affected test replicates included: Samples 12546 (Replicates C and D); 12551 (Replicate C); 12590 (Replicate K); and, 12610 (Replicate E).

Sample 12550, Replicate F apparently had an initial allocation of eleven amphipods rather then ten when the test was started.

Sample 12593 exhibited *Hyalella azteca* acute toxicity in the retest series. Replicate L of the *Hyalella azteca* chronic test for this sample was examined on Day 15. Surviving amphipods were recovered in this replicate, therefore the chronic toxicity test was continued. Replicate L was removed from the testing system and excluded from the analysis of chronic data.

Some minor recording discrepancies in the number of amphipods surviving versus the number of amphipods weighed occurred: 12662 Replicate K (Day 28 seven surviving, six weighed); 12638 Replicate C (Day 42 nine surviving, eight weighed); 12640 Replicate C (Day 42 five surviving, six weighed); 12640 Replicate H (Day 42 seven surviving, eight weighed); and, 13641 D (Day 42 seven surviving, nine weighed). Data were tabulated and statistical analyses were performed using the recorded data.

RESULTS:

Summary result tabulations for the *Hyalella azteca* whole sediment toxicity tests are located in Appendix A.

Statistical Group 1 Results (Lotic, creek habitat): The combined responses for samples 12664 (Prairie DuPont) and 12665 (Prairie Dupont 2) were used as reference site data for statistical comparisons. Two computer runs were conducted due to limitations associated with the statistical software (A limited number of samples can be analyzed concurrently).

The first computer run included samples 12549 (BTOX-D-1), 12550 (BTOX-D-2), 12551(BTOX-D-3), 12609 (E-1 Dead Creek), 12610 (E-2 Dead Creek), 12611 (E-3 Dead Creek), 12639 (F-1 Dead Creek), 12640 (F2 Dead Creek), and 12641 (F3 Dead Creek). Sample 12609 exhibited statistically significant reductions in mean survival on Days 28, 35, and 42. Sample 12611 exhibited statistically significant reductions in mean survival on Days 28 and 42.

This second computer run of statistical analyses included samples 12546 (BTOX-C-1), 12547 (BTOX-C-2), 12548 (BTOX-C-3), 12589 (BTOX-B-1), 12590 (BTOX-B-1 Dup), 12592 (BTOX-B-

3), 12593 (BTOX-B-M), and 12666 (Reference Creek). Samples 12589, 12590, and 12592 exhibited statistically significant reductions in mean survival on Days 28, 35, and 42. Sample 12666 exhibited a statistically significant reduction in mean survival on Day 28.

Statistical Group 2 Results (Lentic, pond habitat): Sample 12671 (Ref 2-2 Ref Borrow Pit) was used as the reference site for statistical comparisons. This statistical group included samples 12612 (BP-1 Borrow Pit), 12613 (BP-1 (Dup) Borrow Pit), 12614 (BP-3 Borrow Pit) and, 12638 (BP-2 Borrow Pit). None of the samples in this statistical group exhibited statistically significant reductions in the responses evaluated.

QUALITY ASSURANCE:

A standard reference toxicant SRT test was conducted concurrently with a representative batch of *Hyalella azteca*. The resulting LC50 value fell within control chart limits and was viewed as being acceptable.

Summary of Statistical Tests and Probabilities

BTR: 3615

Day 28		Survival: Proportion Surviving	Survival: F-Test Equal Variance	Survival: T-Test Statistical Probability	Survival: Statistically Significant[1]	Growth: Average Weight(mg)	Growth: F-Test Equal Variance	Growth: T-Test Statistical Probability	Growth: Statistically Significant[1]	Neonate Production: Average neonates/ female	Neonate Production: F-Test Equal Variance	Neonate Production: T-Test Statistical Probability	Neonate Production: Statistically Significant[1]
12552	Control	0.55				0.982							
12546	Sample	0.93	0.061	0.005		0.766	0.026	0.056					
12547	Sample	0.88	0.669	0.000		0.456	0.183	0.003	*				
12548	Sample	0.90	0.742	0.000		0.656	0.905	0.040	*				
12549	Sample	0.89	0.192	0.000		0.571	0.244	0.008	*				
Day 35													
12552	Control	0.51											
12546	Sample	0.92	0.282	0.025									
12547	Sample	0.76	0.292	0.011									
12548	Sample	0.80	0.447	0.020									
12549	Sample	0.85	0.134	0.001									
Day 42													
12552	Control	0.46				0.231				0.6			
12546	Sample	0.87	0.383	0.025		0.510	0.750	0.000		11.5	0.038	0.000	
12547	Sample	0.73	0.475	0.014		0.489	0.725	0.000		3.7	0.157	0.002	
12548	Sample	0.76	0.548	0.024		0.402	0.086	0.000		3.3	0.106	0.006	
12549	Sample	0.84	0.112	0.001		0.414	0.039	0.000		5.1	0.189	0.000	

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05)

[redacted]

Amphipod, *Hyalella azteca*, Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3615
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	Day 28 Data: # Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Reps I-L (mg)
12552	A	10	8	0.80						
	B	10	7	0.70						
	C	10	8	0.80						
	D	10	7	0.70						
	E	10	6	0.60						
	F	10	6	0.60						
	G	10	8	0.80						
	H	10	7	0.70						
	I	10	4	0.40		24.28	26.97	4	0.672	
	J	10	3	0.30		23.53	26.46	3	0.977	
	K	10	4	0.40		24.62	29.45	4	1.208	
	L	10	5	0.50	0.55	29.02	34.38	5	1.072	0.982
12546	A	10	10	1.00						
	B	10	10	1.00						
	C	10	*	*						
	D	10	*	*						
	E	10	9	0.90						
	F	10	10	1.00						
	G	10	9	0.90						
	H	10	10	1.00						
	I	10	10	1.00		24.59	32.33	10	0.774	
	J	10	7	0.70		24.35	30.13	7	0.826	
	K	10	9	0.90		25.41	31.88	9	0.718	
	L	10	9	0.90	0.93	26.86	33.57	9	0.746	0.766
12547	A	10	10	1.00						
	B	10	9	0.90						
	C	10	9	0.90						
	D	10	10	1.00						
	E	10	8	0.80						
	F	10	10	1.00						
	G	10	9	0.90						
	H	10	7	0.70						
	I	10	9	0.90		21.55	25.42	9	0.430	
	J	10	8	0.80		22.09	27.97	6	0.981	
	K	10	5	0.50		23.08	24.94	5	0.372	
	L	10	10	1.00	0.88	24.80	28.99	10	0.420	0.458
12548	A	10	10	1.00						
	B	10	10	1.00						
	C	10	1	0.10						
	D	10	10	1.00						
	E	10	8	0.80						
	F	10	9	0.90						
	G	10	10	1.00						
	H	10	10	1.00						
	I	10	10	1.00		28.70	32.94	10	0.424	
	J	10	8	0.80		24.18	30.91	8	0.844	
	K	10	8	0.80		25.05	31.18	8	0.820	
	L	10	10	1.00	0.90	25.57	30.84	10	0.512	0.658
12549	A	10	10	1.00						
	B	10	9	0.90						
	C	10	8	0.80						
	D	10	10	1.00						
	E	10	10	1.00						
	F	10	10	1.00						
	G	10	9	0.90						
	H	10	8	0.80						
	I	10	8	0.80		24.04	28.75	8	0.588	
	J	10	8	0.80		27.33	30.71	8	0.423	
	K	10	7	0.70		29.10	33.68	7	0.654	
	L	10	9	0.90	0.88	25.07	31.69	9	0.641	0.571

Sample Number	Replicate	Day 35 Data: # Surviving	Proportion Surviving	Mean Survival	Number Neonates	Day 42 Data: # Surviving	Proportion Surviving	Mean Survival / Sample	# Neonates	Day 35 + 42 Reproduction Data: Total # Neonates	# Females / Rep	Mean Neonates / Female	Mean Neonates / Sample	Day 42 Growth Data: Initial Pan Wt (mg)	Total dry Wt (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Replicates A-H
12552	A	7	0.70		0	7	0.70		0	0	3	0.0		21.20	23.07	7	0.267	
	B	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	C	8	0.80		0	6	0.60		0	0	1	0.0		26.72	28.36	6	0.273	
	D	8	0.80		3	8	0.80		0	3	3	1.0		26.66	27.96	6	0.213	
	E	6	0.60		1	4	0.40		6	7	2	3.5		26.01	27.10	4	0.266	
	F	5	0.50		0	4	0.40		0	0	4	0.0		27.23	28.16	4	0.233	
	G	5	0.50		0	3	0.30		0	0	2	0.0		28.10	28.79	3	0.230	
	H	7	0.70	0.61	2	7	0.70	0.46	0	2	4	0.5	0.6	26.31	28.55	7	0.320	0.231
12546	A	10	1.00		23	8	0.80		36	59	6	9.8		28.18	31.06	8	0.358	
	B	9	0.90		7	8	0.80		29	36	4	9.0		20.34	25.10	8	0.685	
	C	*	*		*	*	*		*	*	*	*		*	*	*	*	
	D	*	*		*	*	*		*	*	*	*		*	*	*	*	
	E	8	0.80		42	8	0.80		43	85	5	17.0		26.73	31.54	8	0.601	
	F	8	0.80		33	8	0.80		24	57	5	11.4		27.01	32.18	8	0.578	
	G	8	0.80		30	8	0.80		27	57	6	9.5		26.82	30.00	8	0.487	
	H	8	0.80	0.83	29	8	0.80	0.80	19	48	4	12.0	11.5	26.41	29.88	8	0.509	0.510
12547	A	10	1.00		7	10	1.00		17	24	7	3.4		27.39	31.58	10	0.421	
	B	8	0.80		15	8	0.80		0	15	6	2.5		25.97	29.63	8	0.433	
	C	8	0.80		24	8	0.80		0	24	5	4.8		25.71	29.40	8	0.461	
	D	7	0.70		14	6	0.60		0	14	2	7.0		28.73	30.84	6	0.685	
	E	5	0.50		0	4	0.40		0	0	1	0.0		22.82	24.43	4	0.403	
	F	8	0.80		6	8	0.80		14	20	4	5.0		25.13	28.53	8	0.425	
	G	8	0.80		4	7	0.70		5	9	4	2.3		27.02	30.02	7	0.428	
	H	7	0.70	0.76	8	7	0.70	0.73	16	24	5	4.8	3.7	25.67	30.27	7	0.657	0.466
12548	A	10	1.00		18	8	0.80		10	28	5	5.6		24.82	28.39	8	0.446	
	B	10	1.00		21	10	1.00		13	34	8	[illegible]		25.63	29.04	10	0.341	
	C	1	0.10		0	1	0.10		0	0	0	0.0		26.58	27.01	1	0.430	
	D	10	1.00		23	9	0.90		18	41	5	8.2		23.71	26.68	9	0.330	
	E	8	0.80		1	8	0.80		11	12	4	3.0		28.19	31.48	8	0.411	
	F	8	0.80		5	8	0.80		1	6	2	3.0		24.01	27.73	8	0.465	
	G	9	0.90		17	11	1.10		28	41	8	4.8		28.82	34.21	11	0.490	
	H	8	0.80	0.80	5	8	0.80	0.79	7	12	3	4.0	3.3	24.93	28.75	8	0.370	0.402
12549	A	10	1.00		16	10	1.00		15	31	5	6.2		27.07	30.78	10	0.371	
	B	9	0.90		6	8	0.80		4	10	2	5.0		27.18	30.88	8	0.464	
	C	7	0.70		23	8	0.80		21	44	5	8.8		25.01	28.88	8	0.484	
	D	8	0.80		1	7	0.70		6	7	2	3.5		26.48	29.52	7	0.434	
	E	9	0.90		9	9	0.90		9	18	6	3.0		25.11	28.36	9	0.361	
	F	9	0.90		14	9	0.90		16	30	5	6.0		24.98	28.37	9	0.376	
	G	9	0.90		4	8	0.80		6	10	4	2.5		28.80	32.17	9	0.367	
	H	7	0.70	0.85	1	7	0.70	0.84	27	28	5	5.6	5.1	26.55	29.60	7	0.436	0.414

* Replicate excluded from analysis. See Protocol Deviations.

RHB
12/23

Summary of Statistical Tests and Probabilities
BTR: 3615

		Survival				Growth				Neonate Production			
		Proportion Surviving	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Average Weight(mg)	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Average neonates/ female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]
Day 28													
12552	Control	0.55				0.982							
12550	Sample	0.87	0.844	0.000		0.684	0.854	0.066					
12551	Sample	0.80	0.863	0.001		0.731	0.217	0.045	*				
Day 35													
12552	Control	0.51											
12550	Sample	0.85	0.800	0.003									
12551	Sample	0.79	0.498	0.004									
Day 42													
12552	Control	0.46				0.231				0.6			
12550	Sample	0.81	0.978	0.004		0.428	0.143	0.000		4.0	0.036	0.005	
12551	Sample	0.79	0.617	0.003		0.400	0.022	0.000		3.5	0.344	0.001	

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$)

000003

[redacted]

Amphipod, *Hyalella azteca*,
Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3615b
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	Day 28 Data: # Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Reps I-L (mg)
12557	A	10	8	0.80						
	B	10	2	0.20						
	C	10	8	0.80						
	D	10	7	0.70						
	E	10	5	0.50						
	F	10	5	0.50						
	G	10	8	0.80						
	H	10	7	0.70						
	I	10	4	0.40		24.20	28.07	4	0.872	
	J	10	3	0.30		23.53	26.46	3	0.977	
	K	10	4	0.40		24.62	29.45	4	1.208	
	L	10	5	0.50	0.55	29.02	34.38	5	1.072	0.982
12558	A	10	8	0.80						
	B	10	10	1.00						
	C	10	7	0.70						
	D	10	7	0.70						
	E	10	10	1.00						
	F	10	11	1.10						
	G	10	10	1.00						
	H	10	7	0.70						
	I	10	10	1.00		26.35	32.15	10	0.580	
	J	10	8	0.80		21.83	27.15	5	1.064	
	K	10	8	0.80		26.88	31.45	8	0.518	
	L	10	8	0.80	0.87	27.82	32.00	8	0.574	0.684
12559	A	10	10	1.00						
	B	10	9	0.90						
	C	10	*	*						
	D	10	10	1.00						
	E	10	6	0.60						
	F	10	9	0.90						
	G	10	7	0.70						
	H	10	8	0.80						
	I	10	8	0.80		24.07	28.84	8	0.612	
	J	10	9	0.90		23.15	29.29	8	0.882	
	K	10	8	0.80		24.00	29.85	8	0.825	
	L	10	8	0.80	0.80	22.88	29.41	8	0.804	0.731

Sample Number	Replicate	Day 35 Data: # Surviving	Proportion Surviving	Mean Survival	Number Neonates	Day 42 Data: # Surviving	Proportion Surviving	Mean Survival / Sample	# Neonates	Day 35 + 42 Reproduction Data: Total # Neonates	# Females / Rep	Mean Neonates / Female	Mean Neonates / Sample	Day 42 Growth Data: Initial Pan Wt (mg)	Total dry Wt (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Replicates A-H
12557	A	7	0.70		0	7	0.70		0	0	3	0.0		21.20	23.07	7	0.267	
	B	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	C	6	0.60		0	6	0.60		0	0	1	0.0		26.72	28.36	6	0.273	
	D	6	0.60		3	6	0.60		0	3	3	1.0		26.64	27.86	6	0.212	
	E	6	0.60		1	4	0.40		6	7	2	3.5		25.01	26.10	4	0.266	
	F	5	0.50		0	4	0.40		0	0	4	0.0		27.23	28.16	4	0.233	
	G	5	0.50		0	3	0.30		0	0	2	0.0		28.10	28.70	3	0.230	
	H	7	0.70	0.61	2	7	0.70	0.48	0	2	4	0.5	0.6	26.31	26.55	7	0.120	0.211
12558	A	8	0.80		11	5	0.50		8	19	2	9.5		23.02	25.51	5	0.518	
	B	10	1.00		17	10	1.00		18	35	7	5.0		23.03	28.06	10	0.412	
	C	7	0.70		3	6	0.60		3	6	2	3.0		21.63	24.42	6	0.465	
	D	7	0.70		3	7	0.70		18	21	5	4.2		23.47	24.02	7	0.364	
	E	10	1.00		0	10	1.00		8	8	6	1.3		22.04	26.08	10	0.404	
	F	11	1.10		2	10	1.00		0	2	5	0.4		27.01	31.06	10	0.404	
	G	10	1.00		4	10	1.00		7	11	8	1.4		25.41	29.37	10	0.396	
	H	7	0.70	0.86	1	7	0.70	0.81	29	30	5	6.0	6.0	27.53	30.67	7	0.451	0.428
12559	A	10	1.00		16	10	1.00		7	23	7	3.3		23.88	27.57	10	0.371	
	B	9	0.90		7	9	0.90		21	28	5	5.6		22.74	26.07	9	0.437	
	C	*	*		*	*			*	*	*	*		*	*	*		
	D	9	0.90		3	9	0.90		14	17	8	2.1		27.84	31.08	9	0.361	
	E	8	0.80		1	5	0.50		5	6	3	2.0		27.37	29.21	5	0.368	
	F	8	0.80		7	8	0.80		12	19	6	3.2		27.92	31.04	8	0.390	
	G	8	0.80		10	8	0.80		9	19	3	6.3		22.55	24.94	8	0.432	
	H	8	0.80	0.79	1	8	0.80	0.79	5	6	3	2.0	1.9	27.31	30.82	8	0.438	0.400

* Replicate excluded from analysis. See Protocol Deviations.

RHB
2/23

Summary of Statistical Tests and Probabilities

BTR: 3622

Day 28		Survival: Proportion Surviving	Survival: F-Test Equal Variance	Survival: T-Test Statistical Probability	Survival: Statistically Significant[1,3]	Growth: Mean Weight(mg)	Growth: F-Test Equal Variance	Growth: T-Test Statistical Probability	Growth: Statistically Significant[1,3]	Neonate Production: Mean Neonates/ Female	Neonate Production: F-Test Equal Variance	Neonate Production: T-Test Statistical Probability	Neonate Production: Statistically Significant[1,3]
12615	Control	0.62				0.296							
12589	Sample	0.23	0.332	0.001	*	0.255	0.034	0.363					
12590	Sample	0.22	0.083	0.010	*	0.723	0.001	0.120					
12592	Sample	0.49	0.122	0.178		0.304	0.031	0.472					
12593	Sample	0.88	0.030	0.000		0.481	0.493	0.001					
Day 35													
12615	Control	0.36											
12589	Sample	0.08	0.515	0.001	*								
12590	Sample	0.26	0.138	0.200									
12592	Sample	0.40	0.159	0.364									
12593	Sample	0.89	0.066	0.000									
Day 42													
12615	Control	0.33				0.299				1.8			
12589	Sample	0.08	0.689	0.001	*	0.084	0.168	0.000	*	0.0	NA[2]	0.032	*
12590	Sample	0.26	0.087	0.271		0.195	0.030	0.066		0.1	0.000	0.037	*
12592	Sample	0.39	0.082	0.316		0.234	0.833	0.032	*	0.0	NA[2]	0.032	*
12593	Sample	0.85	0.382	0.000		0.348	0.338	0.053		1.6	0.192	0.434	

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).
2. There were not enough sample and/or control response variability to conduct a meaningful F-Test.
3. If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

[redacted]

Amphipod, *Hyalella azteca*, Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3622
Aquatec Biological Sciences

Day 28 Data

Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Reps I-L (mg)
17615	A	10	8	0.80						
	B	10	6	0.60						
	C	10	7	0.70						
	D	10	8	0.80						
	E	10	3	0.30						
	F	10	6	0.60						
	G	10	5	0.50						
	H	10	8	0.80						
	I	10	8	0.80		26.73	28.50	8	0.218	
	J	10	8	0.80		26.74	28.51	8	0.224	
	K	10	5	0.50		23.67	25.20	5	0.324	
	L	10	7	0.70	0.67	25.00	27.70	6	0.317	0.266
17588	A	10	0	0.00						
	B	10	3	0.30						
	C	10	2	0.20						
	D	10	0	0.00						
	E	10	0	0.00						
	F	10	2	0.20						
	G	10	0	0.00						
	H	10	0	0.00						
	I	10	0	0.00		0.00	0.00	0	0.000	
	J	10	7	0.70		28.50	30.22	7	0.248	
	K	10	5	0.50		28.67	32.31	5	0.528	
	L	10	8	0.80	0.23	27.38	29.35	8	0.246	0.255
17590	A	10	3	0.30						
	B	10	0	0.00						
	C	10	2	0.20						
	D	10	0	0.00						
	E	10	0	0.00						
	F	10	10	1.00						
	G	10	3	0.30						
	H	10	4	0.40						
	I	10	1	0.10		25.20	26.50	1	1.300	
	J	10	1	0.10		23.74	24.61	1	0.870	
	K	10	*	*		*	*	*	*	
	L	10	0	0.00	0.22	0.00	0.00	0	0.000	0.723
17592	A	10	10	1.00						
	B	10	5	0.50						
	C	10	1	0.10						
	D	10	5	0.50						
	E	10	2	0.20						
	F	10	2	0.20						
	G	10	2	0.20						
	H	10	8	0.80						
	I	10	0	0.00		0.00	0.00	0	0.000	
	J	10	10	1.00		24.00	30.06	10	0.537	
	K	10	7	0.70		28.48	31.77	7	0.327	
	L	10	8	0.80	0.49	24.01	26.12	8	0.302	0.104
17603	A	10	9	0.90						
	B	10	9	0.90						
	C	10	8	0.80						
	D	10	10	1.00						
	E	10	8	0.80						
	F	10	9	0.90						
	G	10	10	1.00						
	H	10	9	0.90						
	I	10	9	0.90		23.03	27.61	9	0.498	
	J	10	7	0.70		24.03	28.00	7	0.450	
	K	10	9	0.90		24.10	28.64	9	0.494	
	L	10	*	*	0.88	*	*	*	*	0.481

Day 35 Data / Day 42 Data / Day 35 + 42 Reproduction Data / Day 42 Growth Data

Sample Number	Replicate	D35 # Surviving	D35 Proportion Surviving	D35 Mean Survival	D35 Number Neonates	D42 # Surviving	D42 Proportion Surviving	D42 Mean Survival / Sample	D42 # Neonates	Total # Neonates	# Females / Rep	Mean Neonates / Female	Mean Neonates / Sample	Initial Pan Wt. (mg)	Total dry Wt. (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Replicates A-H
17615	A	2	0.20		0	2	0.20		0	0	2	0.0		30.60	31.26	2	0.176	
	B	3	0.30		0	3	0.30		4	4	2	2.0		25.66	26.86	3	0.400	
	C	1	0.10		0	1	0.10		0	0	0	0.0		26.74	27.02	1	0.280	
	D	5	0.50		8	5	0.50		3	11	4	2.8		27.47	28.60	5	0.226	
	E	2	0.20		0	2	0.20		0	0	2	0.0		26.58	27.03	2	0.225	
	F	6	0.60		7	6	0.60		0	7	3	2.3		26.50	28.18	6	0.282	
	G	5	0.50		0	3	0.30		0	0	2	0.0		25.45	26.28	3	0.277	
	H	5	0.50	0.36	13	4	0.40	0.33	10	23	3	7.3	1.8	27.47	28.85	4	0.345	0.279
17588	A	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	B	2	0.20		0	2	0.20		0	0	2	0.0		24.60	25.01	2	0.208	
	C	2	0.20		0	2	0.20		0	0	2	0.0		22.30	22.77	2	0.231	
	D	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	E	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	F	2	0.20		0	2	0.20		0	0	2	0.0		22.29	22.75	2	0.230	
	G	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	H	0	0.00	0.08	0	0	0.00	0.08	0	0	0	0.0	0.0	0.00	0.00	0	0.000	0.084
17590	A	3	0.30		0	3	0.30		0	0	1	0.0		24.92	25.88	3	0.321	
	B	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	C	2	0.20		0	2	0.20		0	0	0	0.0		27.91	28.15	2	0.120	
	D	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	E	0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	F	8	0.80		0	8	0.80		3	3	5	0.6		28.80	31.72	8	0.365	
	G	3	0.30		0	3	0.30		0	0	1	0.0		23.97	25.02	3	0.350	
	H	4	0.40	0.26	0	4	0.40	0.26	0	0	1	0.0	0.1	27.22	28.18	4	0.243	0.195
17592	A	10	1.00		0	10	1.00		0	0	7	0.0		25.08	28.09	10	0.301	
	B	4	0.40		0	4	0.40		0	0	3	0.0		25.94	26.84	4	0.225	
	C	1	0.10		0	1	0.10		0	0	1	0.0		28.88	29.19	1	0.310	
	D	4	0.40		0	4	0.40		0	0	3	0.0		27.25	28.12	4	0.218	
	E	2	0.20		0	2	0.20		0	0	2	0.0		28.52	28.9	2	0.190	
	F	2	0.20		0	2	0.20		0	0	2	0.0		28.70	30.13	2	0.715	
	G	2	0.20		0	1	0.10		0	0	1	0.0		28.35	28.48	1	0.130	
	H	7	0.70	0.40	0	7	0.70	0.39	0	0	5	0.0	0.0	25.90	27.00	7	0.200	0.274
17603	A	8	0.80		0	8	0.80		2	2	5	0.4		28.41	31.88	8	0.308	
	B	8	0.80		0	8	0.80		0	0	2	0.0		28.44	30.66	8	0.281	
	C	8	0.80		0	7	0.70		0	0	3	0.0		23.28	25.78	7	0.361	
	D	8	0.80		4	8	0.80		7	11	5	2.2		22.88	26.28	8	0.380	
	E	8	0.80		7	8	0.80		11	18	5	3.6		28.82	31.84	8	0.378	
	F	9	0.90		8	9	0.90		10	18	5	3.6		25.77	28.78	9	0.334	
	G	10	1.00		0	10	1.00		9	9	6	1.5		25.81	29.54	10	0.373	
	H	9	0.90	0.88	0	8	0.80	0.85	3	3	2	1.5	1.6	27.03	29.26	8	0.279	0.348

* Replicate excluded from analysis. See Protocol Deviations.

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Summary of Statistical Tests and Probabilities

BTR: 3269

		Survival				Growth				Neonate Production			
		Proportion Surviving	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Mean Weight(mg)	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Mean Neonates/ Female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]
Day 28													
12615	Control	0.62				0.296							
12609	Sample	0.72	0.723	0.140		0.688	0.490	0.000					
12610	Sample	0.97	0.000	0.000		0.612	0.333	0.000					
Day 35													
12615	Control	0.36											
12609	Sample	0.63	0.509	0.004									
12610	Sample	0.94	0.039	0.000									
Day 42													
12615	Control	0.33				0.299				1.8			
12609	Sample	0.56	0.718	0.011		0.660	0.026	0.000		9.5	0.054	0.002	
12610	Sample	0.91	0.195	0.000		0.462	0.395	0.000		4.6	0.532	0.043	

1. A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).

Amphipod, ***Hyalella azteca*,**
Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
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BTR 3629
Aquatec Biological Sciences

			Day 28 Data								Day 35 Data				Day 42 Data				Day 35 + 42 Reproduction Data				Day 42 Growth Data				
Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Reps I-L (mg)	# Surviving	Proportion Surviving	Mean Survival	Number Neonates	# Surviving	Proportion Surviving	Mean Survival / Sample	# Neonates	Total # Neonates	# Females / Rep	Mean Neonates / Female	Mean Neonates / Sample	Initial Pan Wt (mg)	Total dry Wt (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Replicates A-H
12015	A	10	8	0.80							2	0.20		0	2	0.20		0	0	2	0.0		30.50	31.26	2	0.376	
	B	10	5	0.50							3	0.30		0	3	0.30		4	4	2	2.0		25.64	26.84	3	0.400	
	C	10	2	0.20							1	0.10		0	1	0.10		0	0	0	0.0		26.74	27.02	1	0.280	
	D	10	8	0.80							5	0.50		8	5	0.50		3	11	4	2.8		27.47	28.60	5	0.226	
	E	10	3	0.30							2	0.20		0	2	0.20		0	0	2	0.0		26.58	27.03	2	0.225	
	F	10	6	0.60							6	0.60		7	6	0.60		0	7	3	2.3		26.50	28.10	6	0.267	
	G	10	5	0.50							5	0.50		0	3	0.30		0	0	2	0.0		25.45	26.28	3	0.277	
	H	10	6	0.60							5	0.50	0.36	12	4	0.40	0.33	10	22	3	7.3	1.8	27.47	28.85	4	0.345	0.288
	I	10	8	0.80		26.73	28.56	8	0.118																		
	J	10	8	0.80		26.74	28.51	8	0.224																		
	K	10	5	0.50		23.67	25.28	5	0.324																		
	L	10	7	0.70	0.62	25.00	27.18	6	0.317	0.266																	
12009	A	10	8	0.80							8	0.80		6	8	0.80		28	34	5	6.8		27.29	30.68	8	0.424	
	B	10	8	0.80							8	0.80		14	8	0.80		51	65	5	13.0		27.47	31.89	8	0.553	
	C	10	7	0.70							7	0.70		2	6	0.60		17	19	3	6.3		25.28	29.07	6	0.635	
	D	10	7	0.70							5	0.50		48	5	0.50		0	48	3	16.0		24.71	28.30	5	0.718	
	E	10	7	0.70							5	0.50		8	4	0.40		4	12	1	12.0		25.02	27.15	4	0.533	
	F	10	5	0.50							4	0.40		0	2	0.20		0	0	2	0.0		22.01	23.77	2	0.880	
	G	10	7	0.70							7	0.70		16	6	0.60		8	24	4	6.0		24.86	28.86	6	0.667	
	H	10	10	1.00							6	0.60	0.63	28	6	0.60	0.56	48	76	5	15.0	9.5	24.74	28.77	6	0.672	0.660
	I	10	8	0.80		26.18	31.17	8	0.624																		
	J	10	6	0.60		25.07	28.82	6	0.650																		
	K	10	10	1.00		25.86	33.70	10	0.784																		
	L	10	3	0.30	0.72	26.83	28.86	3	0.687	0.688																	
12010	A	10	9	0.90							9	0.90		11	9	0.90		4	15	5	3.0		30.06	34.65	9	0.511	
	B	10	10	1.00							9	0.90		0	9	0.90		3	3	3	1.0		25.90	30.29	9	0.488	
	C	10	9	0.90							9	0.90		19	9	0.90		6	25	5	5.0		25.97	30.29	9	0.480	
	D	10	10	1.00							10	1.00		9	9	0.90		8	17	4	4.3		24.93	29.08	9	0.461	
	E	10	*	*							*	*		*	*	*		*	*	*	*		*	*	*	*	
	F	10	10	1.00							9	0.90		11	8	0.80		42	53	5	10.6		26.19	29.60	8	0.428	
	G	10	10	1.00							10	1.00		7	10	1.00		0	7	4	1.8		27.89	32.83	10	0.494	
	H	10	10	1.00							10	1.00	0.94	6	10	1.00	0.91	11	17	3	5.7	4.6	28.80	32.57	10	0.377	0.462
	I	10	10	1.00		25.37	30.21	10	0.484																		
	J	10	8	0.80		23.76	28.45	8	0.586																		
	K	10	10	1.00		23.81	30.68	10	0.687																		
	L	10	10	1.00	0.97	24.71	33.14	10	0.843	0.612																	

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* Replicate excluded from analysis. See Protocol Deviations.

Summary of Statistical Tests and Probabilities

BTR: 3629

		Survival				Growth				Neonate Production			
Day 28		Proportion Surviving	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,2]	Mean Weight(mg)	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Mean Neonates/ Female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]
12622	Control	0.55				0.501							
12611	Sample	0.67	0.749	0.183		0.569	0.446	0.282					
12612	Sample	0.93	0.010	0.000		0.594	0.381	0.107					
12613	Sample	0.89	0.002	0.001		0.636	0.485	0.129					
12614	Sample	0.95	0.001	0.000		0.470	0.644	0.347					
Day 35													
12622	Control	0.38											
12611	Sample	0.53	0.438	0.165									
12612	Sample	0.88	0.460	0.000									
12613	Sample	0.80	0.491	0.001									
12614	Sample	0.86	0.205	0.000									
Day 42													
12622	Control	0.35				0.377				4.0			
12611	Sample	0.50	0.381	0.171		0.369	0.054	0.453		3.2	0.829	0.330	
12612	Sample	0.83	0.335	0.000		0.380	0.879	0.468		4.1	0.068	0.471	
12613	Sample	0.75	0.866	0.002		0.423	0.525	0.161		4.2	0.461	0.448	
12614	Sample	0.84	0.176	0.000		0.322	0.136	0.049	*	5.3	0.143	0.182	

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$).
2. If the F-Test result was significant (relative to the Laboratory Control, $P<0.05$), the T-Test was performed using unequal variances.

Amphipod, *Hyalella azteca*, Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3629
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	Day 28 Data: # Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Reps I-L (mg)	Day 35 Data: # Surviving	Proportion Surviving	Mean Survival	Number Neonates	Day 42 Data: # Surviving	Proportion Surviving	Mean Survival / Sample	# Neonates	Day 35 + 42 Reproduction Data: Total # Neonates	# Females / Rep	Mean Neonates / Female	Mean Neonates / Sample	Day 42 Growth Data: Initial Pan Wt (mg)	Total dry Wt (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Replicates A-H
12622	A	10	2	0.20							2	0.20		0	1	0.10		0	0	0	0.0		22.13	22.55	1	0.420	
	B	10	2	0.20							2	0.20		0	2	0.20		4	4	1	4.0		25.23	25.84	2	0.305	
	C	10	8	0.80							7	0.70		8	6	0.60		7	15	2	7.5		24.55	26.47	6	0.320	
	D	10	8	0.80							1	0.10		4	1	0.10		0	4	0	0.0		26.17	26.60	1	0.430	
	E	10	2	0.20							1	0.10		0	1	0.10		0	0	0	0.0		23.67	24.18	1	0.510	
	F	10	8	0.80							5	0.50		4	5	0.50		8	12	2	6.0		26.58	28.14	5	0.312	
	G	10	5	0.50							6	0.60		5	6	0.60		6	11	2	5.5		26.67	29.17	6	0.417	
	H	10	7	0.70							6	0.60	0.38	5	6	0.60	0.35	21	26	3	8.7	4.0	25.17	27.00	6	0.305	0.377
	I	10	1	0.10		24.40	24.70	1	0.300																		
	J	10	8	0.80		24.02	28.06	9	0.449																		
	K	10	7	0.70		21.44	27.07	7	0.805																		
	L	10	6	0.60	0.55	21.17	24.70	6	0.588	0.501																	
12611	A	10	7	0.70							4	0.40		0	4	0.40		2	2	3	0.7		26.33	28.05	4	0.430	
	B	10	8	0.80							8	0.80		8	8	0.80		43	51	6	8.5		25.01	28.41	8	0.425	
	C	10	2	0.20							2	0.20		1	1	0.10		0	1	0	0.0		25.53	26.11	1	0.580	
	D	10	8	0.80							7	0.70		0	6	0.60		8	8	3	2.7		26.31	28.31	6	0.333	
	E	10	8	0.80							8	0.80		5	8	0.80		21	26	7	3.7		25.10	28.25	9	0.350	
	F	10	0	0.00							0	0.00		0	0	0.00		0	0	0	0.0		0.00	0.00	0	0.000	
	G	10	4	0.40							4	0.40		1	4	0.40		4	5	2	2.5		26.88	28.60	4	0.430	
	H	10	10	1.00							8	0.80	0.53	7	8	0.80	0.50	23	30	4	7.5	3.2	24.50	27.42	8	0.365	0.368
	I	10	8	0.80		22.07	25.83	8	0.470																		
	J	10	9	0.90		22.17	25.52	9	0.372																		
	K	10	8	0.80		22.23	25.87	8	0.455																		
	L	10	8	0.80	0.67	22.08	28.01	9	0.658	0.546																	
12612	A	10	9	0.90							8	0.80		6	8	0.80		8	14	3	4.7		24.61	27.68	8	0.384	
	B	10	9	0.90							8	0.80		3	7	0.70		17	20	4	5.0		24.80	27.58	7	0.397	
	C	10	10	1.00							10	1.00		0	8	0.80		11	22	3	7.3		26.85	28.45	8	0.200	
	D	10	7	0.70							6	0.60		2	6	0.60		2	4	2	2.0		24.78	28.01	6	0.540	
	E	10	10	1.00							10	1.00		11	10	1.00		7	18	4	4.5		26.57	30.43	10	0.386	
	F	10	8	0.80							8	0.80		7	8	0.80		6	13	4	3.3		26.14	28.98	8	0.355	
	G	10	10	1.00							10	1.00		5	9	0.90		6	11	4	2.8		27.59	30.71	9	0.347	
	H	10	10	1.00							10	1.00	0.88	5	10	1.00	0.83	7	12	4	3.0	4.1	26.38	29.82	10	0.344	0.380
	I	10	9	0.90		25.91	31.50	9	0.621																		
	J	10	10	1.00		24.20	30.10	10	0.590																		
	K	10	10	1.00		24.46	31.13	10	0.667																		
	L	10	10	1.00	0.93	22.70	28.57	10	0.587	0.604																	
12613	A	10	10	1.00							8	0.80		3	6	0.60		13	16	4	4.0		26.82	28.98	6	0.360	
	B	10	10	1.00							10	1.00		1	10	1.00		15	16	4	4.0		25.58	29.29	10	0.371	
	C	10	9	0.90							9	0.90		0	9	0.90		16	16	8	2.0		26.07	29.14	9	0.341	
	D	10	9	0.90							9	0.90		6	9	0.90		12	18	3	6.0		26.56	30.03	9	0.386	
	E	10	9	0.90							4	0.40		5	3	0.30		4	9	1	9.0		24.41	28.57	3	0.053	
	F	10	8	0.80							8	0.80		4	8	0.80		16	20	5	4.0		26.98	30.18	8	0.400	
	G	10	8	0.80							8	0.80		2	8	0.80		9	11	3	3.7		27.40	30.79	8	0.424	
	H	10	8	0.80							8	0.80	0.80	8	7	0.70	0.75	8	14	3	4.7	4.2	26.18	29.33	7	0.450	0.423
	I	10	9	0.90		22.01	27.24	9	0.581																		
	J	10	9	0.90		22.78	30.70	9	0.881																		
	K	10	10	1.00		22.48	27.08	10	0.460																		
	L	10	8	0.80	0.89	25.18	30.08	8	0.611	0.636																	
12614	A	10	10	1.00							7	0.70		3	9	0.90		21	24	6	4.0		26.74	29.96	9	0.358	
	B	10	9	0.90							9	0.90		2	8	0.80		8	10	3	3.3		28.85	31.18	8	0.290	
	C	10	9	0.90							7	0.70		6	7	0.70		8	14	3	4.7		25.74	28.16	7	0.346	
	D	10	9	0.90							9	0.90		4	9	0.90		26	30	5	6.0		25.36	28.97	9	0.402	
	E	10	10	1.00							10	1.00		1	7	0.70		38	39	4	9.8		25.78	27.81	7	0.290	
	F	10	9	0.90							9	0.90		13	9	0.90		14	27	5	5.4		27.98	30.34	8	0.295	
	G	10	10	1.00							10	1.00		1	10	1.00		27	28	7	4.0		24.25	27.25	10	0.300	
	H	10	10	1.00							8	0.80	0.86	3	7	0.70	0.84	6	9	2	4.5	5.3	24.50	26.45	7	0.279	0.322
	I	10	10	1.00		21.38	26.76	10	0.538																		
	J	10	10	1.00		22.80	26.02	10	0.342																		
	K	10	8	0.80		23.07	27.05	8	0.498																		
	L	10	10	1.00	0.95	24.53	29.57	10	0.504	0.470																	

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Summary of Statistical Tests and Probabilities

BTR: 3633

		Survival				Growth				Neonate Production			
Day 28		Proportion *Surviving*	F-Test Equal *Variance*	T-Test Statistical *Probability*	Statistically Significant[1,2]	Average *Weight(mg)*	F-Test Equal *Variance*	T-Test Statistical *Probability*	Statistically Significant[1]	Mean Neonates/ *Female*	F-Test Equal *Variance*	T-Test Statistical *Probability*	Statistically Significant[1]
12622	Control	0.55				0.501							
12638	Sample	0.82	0.203	0.006		0.563	0.740	0.219					
12639	Sample	0.91	0.007	0.000		0.639	0.786	0.060					
12640	Sample	0.90	0.007	0.001		0.554	0.620	0.245					
12641	Sample	0.89	0.011	0.001		0.661	0.912	0.055					
Day 35													
12622	Control	0.38											
12638	Sample	0.74	0.728	0.003									
12639	Sample	0.89	0.190	0.000									
12640	Sample	0.74	0.005	0.002									
12641	Sample	0.85	0.116	0.000									
Day 42													
12622	Control	0.35				0.377				4.0			
12638	Sample	0.73	0.550	0.002		0.390	0.372	0.394		4.3	0.271	0.418	
12639	Sample	0.84	0.342	0.000		0.397	0.024	0.260		4.8	0.081	0.269	
12640	Sample	0.70	0.036	0.002		0.447	0.876	0.051		3.8	0.440	0.470	
12641	Sample	0.76	0.215	0.001		0.406	0.400	0.202		4.8	0.107	0.277	

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).
2. If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

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Amphipod, *Hyalella azteca*, Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3633
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	Day 28 Data: # Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Reps I-L (mg)
12037	A	10	2	0.20						
	B	10	2	0.20						
	C	10	8	0.80						
	D	10	8	0.80						
	E	10	2	0.20						
	F	10	8	0.80						
	G	10	5	0.50						
	H	10	7	0.70						
	I	10	1	0.10		24.40	24.78	1	0.380	
	J	10	9	0.90		24.02	28.06	9	0.449	
	K	10	7	0.70		23.44	27.07	6	0.606	
	L	10	6	0.60	0.55	23.17	26.70	6	0.588	0.501
12038	A	10	4	0.40						
	B	10	7	0.70						
	C	10	10	1.00						
	D	10	8	0.80						
	E	10	8	0.80						
	F	10	8	0.80						
	G	10	8	0.80						
	H	10	6	0.60						
	I	10	10	1.00		20.52	24.93	10	0.441	
	J	10	10	1.00		21.56	26.96	10	0.540	
	K	10	8	0.80		22.80	27.70	8	0.613	
	L	10	8	0.80	0.87	23.12	28.50	8	0.690	0.583
12039	A	10	10	1.00						
	B	10	8	0.80						
	C	10	8	0.80						
	D	10	8	0.80						
	E	10	9	0.90						
	F	10	10	1.00						
	G	10	9	0.90						
	H	10	10	1.00						
	I	10	8	0.80		21.79	26.42	8	0.579	
	J	10	9	0.90		23.94	30.98	9	0.782	
	K	10	10	1.00		24.61	32.88	10	0.827	
	L	10	10	1.00	0.91	24.90	30.59	10	0.569	0.689
12040	A	10	8	0.80						
	B	10	9	0.90						
	C	10	9	0.90						
	D	10	9	0.90						
	E	10	9	0.90						
	F	10	9	0.90						
	G	10	8	0.80						
	H	10	10	1.00						
	I	10	10	1.00		24.85	30.81	10	0.596	
	J	10	10	1.00		24.87	29.04	10	0.417	
	K	10	7	0.70		22.24	26.68	7	0.634	
	L	10	10	1.00	0.90	25.07	30.55	10	0.548	0.554
12041	A	10	9	0.90						
	B	10	10	1.00						
	C	10	10	1.00						
	D	10	10	1.00						
	E	10	9	0.90						
	F	10	7	0.70						
	G	10	8	0.80						
	H	10	8	0.80						
	I	10	10	1.00		22.53	28.22	10	0.569	
	J	10	9	0.90		21.80	26.97	9	0.574	
	K	10	9	0.90		21.81	27.78	9	0.663	
	L	10	8	0.80	0.89	25.18	31.88	8	0.838	0.661

Sample Number	Replicate	Day 35 Data: # Surviving	Proportion Surviving	Mean Survival	Number Neonates	Day 42 Data: # Surviving	Proportion Surviving	Mean Survival / Sample	# Neonates
12037	A	3	0.30		0	1	0.10		0
	B	2	0.20		0	2	0.20		4
	C	7	0.70		8	6	0.60		7
	D	1	0.10		4	1	0.10		0
	E	1	0.10		0	1	0.10		0
	F	5	0.50		4	5	0.50		8
	G	6	0.60		5	6	0.60		6
	H	6	0.60	0.38	5	6	0.60	0.35	21
12038	A	4	0.40		0	4	0.40		3
	B	7	0.70		7	7	0.70		18
	C	10	1.00		3	8	0.80		20
	D	8	0.80		16	8	0.80		31
	E	8	0.80		6	8	0.80		12
	F	8	0.80		3	7	0.70		13
	G	8	0.80		2	8	0.80		18
	H	6	0.60	0.74	0	5	0.50	0.71	0
12039	A	10	1.00		4	10	1.00		14
	B	8	0.80		1	8	0.80		14
	C	9	0.90		0	9	0.90		8
	D	8	0.80		8	7	0.70		13
	E	9	0.90		4	8	0.80		21
	F	10	1.00		2	9	0.90		5
	G	7	0.70		2	6	0.60		12
	H	10	1.00	0.89	4	10	1.00	0.84	9
12040	A	7	0.70		1	7	0.70		7
	B	8	0.80		10	8	0.80		25
	C	6	0.60		8	5	0.50		12
	D	8	0.80		8	8	0.80		14
	E	7	0.70		10	7	0.70		23
	F	7	0.70		0	6	0.60		2
	G	8	0.80		4	8	0.80		9
	H	8	0.80	0.74	3	7	0.70	0.70	12
12041	A	9	0.90		0	9	0.90		12
	B	10	1.00		9	8	0.80		22
	C	9	0.90		0	8	0.80		28
	D	9	0.90		8	7	0.70		18
	E	9	0.90		7	8	0.80		14
	F	7	0.70		3	5	0.50		5
	G	8	0.80		1	7	0.70		27
	H	7	0.70	0.85	3	7	0.70	0.76	6

Sample Number	Replicate	Day 35 + 42 Reproduction Data: Total # Neonates	# Females / Rep	Mean Neonates / Female	Mean Neonates / Sample	Day 42 Growth Data: Initial Pan Wt (mg)	Total dry Wt (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Replicates A-H
12037	A	0	0	0.0		33.13	33.55	1	0.420	
	B	4	1	4.0		25.23	26.84	3	0.536	
	C	15	2	7.5		24.55	26.47	6	0.320	
	D	4	0	0.0		28.17	28.60	1	0.430	
	E	0	0	0.0		23.87	24.18	1	0.310	
	F	12	3	4.0		26.58	28.14	5	0.312	
	G	11	2	5.5		20.67	23.17	6	0.417	
	H	26	3	8.7	4.0	25.17	27.00	6	0.305	0.377
12038	A	3	1	3.0		28.41	28.99	4	0.145	
	B	25	4	6.3		29.87	32.81	7	0.423	
	C	23	5	4.6		27.24	30.15	8	0.364	
	D	47	6	7.8		29.80	32.43	8	0.329	
	E	18	4	4.5		28.01	30.82	8	0.351	
	F	16	4	4.0		26.01	28.84	7	0.390	
	G	20	5	4.0		23.06	26.03	8	0.370	
	H	0	1	0.0	4.3	25.48	27.01	5	0.306	0.380
12039	A	18	3	6.0		28.80	32.18	10	0.338	
	B	15	3	5.0		28.54	31.87	8	0.416	
	C	8	3	2.7		22.41	26.12	9	0.412	
	D	25	3	8.3		25.84	28.41	7	0.366	
	E	25	5	5.0		23.12	26.62	8	0.438	
	F	7	2	3.5		25.00	28.36	9	0.373	
	G	14	2	7.0		25.46	27.99	6	0.422	
	H	13	4	3.3	4.8	22.88	26.57	10	0.361	0.397
12040	A	8	2	4.0		28.18	33.16	7	0.567	
	B	35	8	4.4		27.94	30.84	8	0.318	
	C	18	4	4.5		26.68	29.13	6	0.408	
	D	22	3	7.3		26.49	30.50	8	0.501	
	E	33	5	6.6		22.20	25.41	7	0.459	
	F	2	3	0.7		21.58	24.78	6	0.533	
	G	13	5	2.6		24.38	27.25	8	0.361	
	H	15	3	5.0	3.8	27.20	30.48	8	0.410	0.447
12041	A	12	3	4.0		27.20	30.82	9	0.380	
	B	31	6	5.2		25.43	28.81	8	0.423	
	C	28	4	7.0		26.28	30.51	9	0.470	
	D	26	4	6.5		22.84	25.88	9	0.340	
	E	21	5	4.2		23.45	26.55	9	0.344	
	F	8	3	2.7		24.38	26.64	5	0.450	
	G	28	4	7.0		24.52	27.86	7	0.477	
	H	9	4	2.3	4.8	25.58	28.08	7	0.357	0.406

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Summary of Statistical Tests and Probabilities

BTR: 3641

		Survival				Growth				Neonate Production			
		Proportion Surviving	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Mean Weight(mg)	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,2]	Mean Neonates/ Female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]
Day 28													
12668	Control	0.73				0.477							
12664	Sample	0.90	0.559	0.012		0.443	0.439	0.312					
12665	Sample	0.89	0.237	0.014		0.648	0.940	0.036					
12666	Sample	0.70	0.780	0.333		0.613	0.992	0.070					
12671	Sample	0.87	0.334	0.034		0.458	0.423	0.389					
Day 35													
12668	Control	0.65											
12664	Sample	0.83	0.763	0.046									
12665	Sample	0.85	0.521	0.030									
12666	Sample	0.64	0.786	0.438									
12671	Sample	0.85	0.480	0.022									
Day 42													
12668	Control	0.59				0.293				2.2			
12664	Sample	0.79	0.942	0.014		0.346	0.270	0.266		2.6	0.684	0.316	
12665	Sample	0.80	0.965	0.014		0.498	0.018	0.009		6.2	0.067	0.001	
12666	Sample	0.65	0.449	0.249		0.459	0.573	0.001		2.3	0.015	0.483	
12671	Sample	0.83	0.744	0.007		0.351	0.133	0.196		3.4	0.135	0.113	

1 * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).
2 If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

Amphipod, *Hyalella azteca*,
Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3641
Aquatec Biological Sciences

Day 28 Data

Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Reps I-L (mg)
12660	A	10	6	0.60						
	B	10	8	0.80						
	C	10	10	1.00						
	D	10	7	0.70						
	E	10	10	1.00						
	F	10	8	0.80						
	G	10	7	0.70						
	H	10	3	0.30						
	I	10	8	0.80		25.87	28.66	8	0.613	
	J	10	8	0.80		25.00	28.11	8	0.337	
	K	10	8	0.80		24.52	28.37	8	0.481	
	L	10	7	0.70	0.73	24.80	28.03	7	0.477	0.477
12664	A	10	10	1.00						
	B	10	10	1.00						
	C	10	8	0.80						
	D	10	10	1.00						
	E	10	8	0.80						
	F	10	10	1.00						
	G	10	4	0.40						
	H	10	8	0.80						
	I	10	8	0.80		22.26	26.88	8	0.574	
	J	10	8	0.80		22.88	27.13	8	0.472	
	K	10	8	0.80		25.23	28.68	8	0.370	
	L	10	10	1.00	0.80	24.30	28.35	10	0.405	0.443
12665	A	10	10	1.00						
	B	10	10	1.00						
	C	10	10	1.00						
	D	10	9	0.90						
	E	10	8	0.80						
	F	10	7	0.70						
	G	10	9	0.90						
	H	10	7	0.70						
	I	10	9	0.90		22.47	27.44	9	0.552	
	J	10	8	0.80		26.22	31.70	8	0.685	
	K	10	10	1.00		24.30	32.13	10	0.783	
	L	10	10	1.00	0.89	22.00	28.30	10	0.570	0.648
12666	A	10	4	0.40						
	B	10	8	0.80						
	C	10	10	1.00						
	D	10	5	0.50						
	E	10	5	0.50						
	F	10	8	0.80						
	G	10	8	0.80						
	H	10	6	0.60						
	I	10	8	0.80		25.83	28.81	8	0.478	
	J	10	5	0.50		26.53	30.26	5	0.746	
	K	10	8	0.80		24.83	28.49	8	0.583	
	L	10	8	0.80	0.70	25.24	30.43	8	0.648	0.613
12671	A	10	8	0.80						
	B	10	9	0.90						
	C	10	10	1.00						
	D	10	9	0.90						
	E	10	9	0.90						
	F	10	10	1.00						
	G	10	8	0.80						
	H	10	10	1.00						
	I	10	9	0.90		23.60	28.14	9	0.516	
	J	10	6	0.60		22.40	25.43	6	0.490	
	K	10	8	0.80		26.25	29.96	8	0.464	
	L	10	9	0.90	0.87	24.84	28.09	9	0.361	0.458

Sample Number	Replicate	Day 35 Data: # Surviving	Proportion Surviving	Mean Survival	Number Neonates	Day 42 Data: # Surviving	Proportion Surviving	Mean Survival / Sample	# Neonates	Day 35 + 42 Reproduction Data: Total # Neonates	# Females / Rep	Mean Neonates / Female	Mean Neonates / Sample	Day 42 Growth Data: Initial Pan Wt (mg)	Total dry Wt (mg)	# Organisms Weighed	Mean Wt within Rep (mg)	Mean Wt Replicates A-H
12660	A	5	0.50		2	5	0.50		5	7	2	3.5		28.26	30.63	5	0.434	
	B	7	0.70		2	6	0.60		6	8	4	2.0		28.00	28.12	8	0.338	
	C	8	0.80		7	8	0.80		3	10	3	3.3		24.55	27.24	8	0.336	
	D	6	0.60		5	4	0.40		10	15	4	3.8		25.07	26.73	4	0.188	
	E	10	1.00		3	8	0.80		2	5	3	1.7		27.50	29.88	8	0.298	
	F	7	0.70		6	7	0.70		2	8	6	1.3		28.25	30.07	7	0.248	
	G	8	0.80		1	6	0.60		10	11	5	2.2		25.25	27.08	6	0.305	
	H	3	0.30	0.66	0	3	0.30	0.58	0	0	1	0.0	2.2	21.84	22.54	3	0.200	0.283
12664	A	8	0.80		6	8	0.80		2	8	6	1.3		28.64	31.70	8	0.280	
	B	10	1.00		2	8	0.80		10	12	5	2.4		28.05	28.02	8	0.330	
	C	8	0.80		3	8	0.80		7	10	3	3.3		27.56	30.32	8	0.345	
	D	8	0.80		11	8	0.80		11	22	4	5.5		23.47	26.28	8	0.351	
	E	8	0.80		0	8	0.80		1	1	2	0.5		27.84	31.00	8	0.395	
	F	8	0.80		8	8	0.80		8	17	7	2.4		28.82	32.11	8	0.368	
	G	4	0.40		2	4	0.40		4	8	3	2.0		28.07	28.21	4	0.310	
	H	8	0.80	0.83	4	8	0.80	0.78	11	15	5	3.0	2.8	28.78	32.33	8	0.394	0.348
12665	A	9	0.90		2	9	0.90		34	36	4	9.0		24.80	29.03	9	0.487	
	B	11	1.10		12	11	1.10		21	33	4	8.3		27.27	31.53	11	0.387	
	C	10	1.00		13	8	0.80		35	48	6	8.0		25.55	29.78	8	0.471	
	D	9	0.90		3	8	0.80		12	15	4	3.8		25.82	29.85	8	0.504	
	E	8	0.80		6	8	0.80		8	14	5	2.8		25.00	30.44	8	0.680	
	F	7	0.70		2	7	0.70		25	27	3	9.0		23.30	28.12	7	0.678	
	G	9	0.90		9	6	0.60		7	16	5	3.2		27.37	30.85	6	0.580	
	H	8	0.80	0.95	8	6	0.60	0.80	10	18	3	5.3	5.2	27.28	28.50	6	0.203	0.498
12666	A	3	0.30		0	3	0.30		1	1	2	0.5		28.11	30.88	1	0.621	
	B	8	0.80		6	8	0.80		6	12	6	2.0		21.50	27.15	8	0.456	
	C	8	0.80		2	10	1.00		3	5	5	1.0		23.21	28.88	10	0.375	
	D	5	0.50		2	5	0.50		6	8	2	4.0		24.04	26.18	5	0.424	
	E	5	0.50		1	5	0.50		1	2	3	0.7		28.74	30.81	5	0.414	
	F	7	0.70		10	7	0.70		11	21	2	10.5		25.82	28.55	7	0.419	
	G	8	0.80		0	8	0.80		1	1	4	0.3		27.14	30.87	8	0.470	
	H	8	0.80	0.64	0	8	0.80	0.65	4	4	3	1.3	2.3	30.88	33.77	8	0.482	0.450
12671	A	5	0.50		2	4	0.40		7	9	2	4.5		29.18	30.58	4	0.350	
	B	8	0.80		2	8	0.80		12	14	2	7.0		28.67	31.47	8	0.350	
	C	10	1.00		6	10	1.00		25	31	6	5.2		24.30	27.45	10	0.315	
	D	9	0.90		0	9	0.90		0	0	2	0.0		21.15	24.57	9	0.380	
	E	9	0.90		10	9	0.90		12	22	5	4.4		28.62	31.84	9	0.360	
	F	9	0.90		4	9	0.90		2	6	3	2.0		29.20	28.33	6	0.348	
	G	9	0.90		1	9	0.90		13	16	5	3.2		30.01	33.62	9	0.401	
	H	8	0.80	0.85	1	8	0.80	0.83	0	1	1	1.0	3.4	24.77	27.14	8	0.296	0.351

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Title: MC Dead Creek Ha Chronic - Prarie vs D,E,F - D28 S
File: pdefha8s Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	8.7100	31.4600	49.6600	31.4600	8.7100
OBSERVED	10	28	41	49	2

Chi-Square = 17.0301 (p-value = 0.0019)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normality and should not be performed with this data as is.

```
Title:  MC Dead Creek Ha Chronic - Prarie vs D,E,F - D28 S
File:          pdefhas6                Transform:      ARC SINE(SQUARE ROOT(Y))

                 Bartlett's Test for Homogeneity of Variance
----------------------------------------------------------------------

Calculated B1 statistic = 31.9155                   (p-value = 0.0002)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

----------------------------------------------------------------------

Critical B = 21.6660  (alpha = 0.01, df =  9)
           = 16.9190  (alpha = 0.05, df =  9)

----------------------------------------------------------------------

                    Using Average Degrees of Freedom
                 (Based on average replicate size of   13.00)

Calculated B2 statistic = 35.8140                   (p-value = 0.0000)

Data FAIL B2 homogeneity test at 0.01 level. Try another transformation.
```

Title: MC Dead Creek Ha Chronic - Prarie vs D,E,F - D28 S
File: pdefha8s Transform: ARC SINE(SQUARE ROOT(Y))

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	1.2601				
2	12549	1.2464	206.00	145	12	
3	12550	1.2104	203.00	145	12	
4	12551	1.1304	145.50	126	11	
5	12609	1.0301	138.00	145	12	*
6	12610	1.3676	246.50	126	11	
7	12611	0.9721	141.00	145	12	*
8	12639	1.2697	217.50	145	12	
9	12640	1.2582	211.50	145	12	
10	12641	1.2464	206.00	145	12	

Critical values are 1 tailed (k = 9)

Title: MC Dead Creek HA Chronic - Prarie vs D,E,F - D28 G
File: pdefha8g Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.6397
W = 0.9566

Critical W = 0.9240 (alpha = 0.01 , N = 44)
W = 0.9440 (alpha = 0.05 , N = 44)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC Dead Creek HA Chronic - Prarie vs D,E,F - D28 G
File:          pdefha8g              Transform:            NO TRANSFORMATION

                Bartlett's Test for Homogeneity of Variance
---------------------------------------------------------------------------

Calculated B1 statistic =  8.2709              (p-value = 0.5071)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

---------------------------------------------------------------------------

Critical B = 21.6660  (alpha = 0.01, df =  9)
           = 16.9190  (alpha = 0.05, df =  9)

---------------------------------------------------------------------------

                    Using Average Degrees of Freedom
                (Based on average replicate size of    4.40)

Calculated B2 statistic =  8.2198              (p-value = 0.5122)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.
```

Title: MC Dead Creek HA Chronic - Prarie vs D,E,F - D28 G
File: pdefha8g Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	9	0.1749	0.0194	1.0325
Within (Error)	34	0.6397	0.0188	
Total	43	0.8146		

(p-value = 0.4351)

Critical F = 2.9810 (alpha = 0.01, df = 9,34)
= 2.1696 (alpha = 0.05, df = 9,34)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: MC Dead Creek HA Chronic - Prarie vs D,E,F - D28 G
File: pdefha8g Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	12664/5	0.5451	0.5451		
2	12549	0.5715	0.5715	-0.3140	
3	12550	0.6840	0.6840	-1.6533	
4	12551	0.7307	0.7307	-2.2099	
5	12609	0.6885	0.6885	-1.7069	
6	12610	0.6120	0.6120	-0.7961	
7	12611	0.5688	0.5688	-0.2813	
8	12639	0.6393	0.6393	-1.1206	
9	12640	0.5538	0.5538	-0.1027	
10	12641	0.6610	0.6610	-1.3795	

Bonferroni t critical value = 2.6857 (1 Tailed, alpha = 0.05, df = 9,34)

Title: MC Dead Creek HA Chronic - Prarie vs D,E,F - D28 G
File: pdefha8g Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	12664/5	8			
2	12549	4	0.2256	41.4	-0.0264
3	12550	4	0.2256	41.4	-0.1389
4	12551	4	0.2256	41.4	-0.1856
5	12609	4	0.2256	41.4	-0.1434
6	12610	4	0.2256	41.4	-0.0669
7	12611	4	0.2256	41.4	-0.0236
8	12639	4	0.2256	41.4	-0.0941
9	12640	4	0.2256	41.4	-0.0086
10	12641	4	0.2256	41.4	-0.1159

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D35 S
File: pdefha5s Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	5.7620	20.8120	32.8520	20.8120	5.7620
OBSERVED	4	27	29	23	3

Chi-Square = 4.3843 (p-value = 0.3565)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC Dead Creek HA Chronic -Prarie vs D,E,F- D35 S
File:          pdefha5s              Transform:      ARC SINE(SQUARE ROOT(Y))

                Bartlett's Test for Homogeneity of Variance
----------------------------------------------------------------------------

Calculated B1 statistic = 23.1196               (p-value = 0.0059)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

----------------------------------------------------------------------------

Critical B = 21.6660  (alpha = 0.01, df =  9)
           = 16.9190  (alpha = 0.05, df =  9)

----------------------------------------------------------------------------

                    Using Average Degrees of Freedom
               (Based on average replicate size of    8.60)

Calculated B2 statistic = 23.8757               (p-value = 0.0045)

Data FAIL B2 homogeneity test at 0.01 level. Try another transformation.
```

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D35 S
File: pdefha5s Transform: ARC SINE(SQUARE ROOT(Y))

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	1.1701				
2	12549	1.1872	100.50	58	8	
3	12550	1.1885	103.00	58	8	
4	12551	1.1078	70.50	45	7	
5	12609	0.9173	55.00	58	8	*
6	12610	1.3189	111.50	45	7	
7	12611	0.8058	59.50	58	8	
8	12639	1.2425	112.00	58	8	
9	12640	1.0360	65.00	58	8	
10	12641	1.1872	100.50	58	8	

Critical values are 1 tailed (k = 9)

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 S
File: pdefha2s Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	5.7620	20.8120	32.8520	20.8120	5.7620
OBSERVED	8	17	29	30	2

Chi-Square = 8.5316 (p-value = 0.0739)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 S
File:          pdefha2s              Transform:      ARC SINE(SQUARE ROOT(Y))

                Bartlett's Test for Homogeneity of Variance
----------------------------------------------------------------------------

Calculated B1 statistic = 18.6741                  (p-value = 0.0281)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

----------------------------------------------------------------------------

Critical B = 21.6660  (alpha = 0.01, df =  9)
           = 16.9190  (alpha = 0.05, df =  9)

----------------------------------------------------------------------------

                    Using Average Degrees of Freedom
              (Based on average replicate size of     8.60)

Calculated B2 statistic = 18.8506                  (p-value = 0.0265)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.
```

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 S
File: pdefha2s Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	9	1.6975	0.1886	4.1806
Within (Error)	76	3.4288	0.0451	
Total	85	5.1262		

(p-value = 0.0002)

Critical F = 2.6500 (alpha = 0.01, df = 9,76)
= 2.0055 (alpha = 0.05, df = 9,76)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 S
File: pdefha2s Transform: ARC SINE(SQUARE ROOT(Y))

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05
1	12664/5	1.1093	0.7875		
2	12549	1.1695	0.8375	-0.6546	
3	12550	1.1627	0.8125	-0.5814	
4	12551	1.1137	0.7857	-0.0461	
5	12609	0.8508	0.5625	2.8103	*
6	12610	1.2753	0.9143	-1.7254	
7	12611	0.7749	0.5000	3.6352	*
8	12639	1.1767	0.8375	-0.7333	
9	12640	0.9958	0.7000	1.2336	
10	12641	1.0766	0.7625	0.3546	

Bonferroni t critical value = 2.6029 (1 Tailed, alpha = 0.05, df = 9,76)

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 S
File: pdefha2s Transform: ARC SINE(SQUARE ROOT(Y))

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTRO
1	12664/5	16			
2	12549	8	0.2176	27.1	-0.0500
3	12550	8	0.2176	27.1	-0.0250
4	12551	7	0.2286	28.5	0.0018
5	12609	8	0.2176	27.1	0.2250
6	12610	7	0.2286	28.5	-0.1268
7	12611	8	0.2176	27.1	0.2875
8	12639	8	0.2176	27.1	-0.0500
9	12640	8	0.2176	27.1	0.0875
10	12641	8	0.2176	27.1	0.0250

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 G
File: pdefha2g Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	5.7620	20.8120	32.8520	20.8120	5.7620
OBSERVED	3	26	27	26	4

Chi-Square = 5.4917 (p-value = 0.2405)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 G
File: pdefha2g Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 47.8450 (p-value = 0.0000)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

Critical B = 21.6660 (alpha = 0.01, df = 9)
= 16.9190 (alpha = 0.05, df = 9)

Using Average Degrees of Freedom
(Based on average replicate size of 8.60)

Calculated B2 statistic = 48.0193 (p-value = 0.0000)

Data FAIL B2 homogeneity test at 0.01 level. Try another transformation.

Title: MC Dead Creek HA Chronic -Prarie vs D,E,F- D42 G
File: pdefha2g Transform: NO TRANSFORMATION

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	0.4219				
2	12549	0.4139	106.00	58	8	
3	12550	0.4280	113.50	58	8	
4	12551	0.3997	86.00	45	7	
5	12609	0.6602	147.00	58	8	
6	12610	0.4624	102.00	45	7	
7	12611	0.3694	95.50	58	8	
8	12639	0.3968	105.00	58	8	
9	12640	0.4471	114.00	58	8	
10	12641	0.4063	99.00	58	8	

Critical values are 1 tailed (k = 9)

Title: MC Dead creek HA Chronic -Prarie vs D,E,F- D42 Neonates
File: pdefha2n Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	5.7620	20.8120	32.8520	20.8120	5.7620
OBSERVED	2	28	30	19	7

Chi-Square = 5.6101 (p-value = 0.2302)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC Dead creek HA Chronic -Prarie vs D,E,F- D42 Neonates
File:           pdefha2n              Transform:            NO TRANSFORMATION

                 Bartlett's Test for Homogeneity of Variance
----------------------------------------------------------------------------

Calculated B1 statistic = 17.5394                  (p-value = 0.0409)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

----------------------------------------------------------------------------

Critical B = 21.6660  (alpha = 0.01, df =  9)
           = 16.9190  (alpha = 0.05, df =  9)

----------------------------------------------------------------------------

                     Using Average Degrees of Freedom
                 (Based on average replicate size of    8.60)

Calculated B2 statistic = 17.8599                  (p-value = 0.0368)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.
```

Title: MC Dead creek HA Chronic -Prarie vs D,E,F- D42 Neonates
File: pdefha2n Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	9	226.8432	25.2048	2.8493
Within (Error)	76	672.2918	8.8459	
Total	85	899.1350		

(p-value = 0.0060)

Critical F = 2.6500 (alpha = 0.01, df = 9,76)
= 2.0055 (alpha = 0.05, df = 9,76)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: MC Dead creek HA Chronic -Prarie vs D,E,F- D42 Neonates
File: pdefha2n Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	12664/5	4.3625	4.3625		
2	12549	5.0750	5.0750	-0.5532	
3	12550	3.9625	3.9625	0.3106	
4	12551	3.5000	3.5000	0.6399	
5	12609	9.5125	9.5125	-3.9988	
6	12610	4.5714	4.5714	-0.1550	
7	12611	3.2000	3.2000	0.9027	
8	12639	4.8500	4.8500	-0.3785	
9	12640	3.8375	3.8375	0.4076	
10	12641	4.8375	4.8375	-0.3688	

Bonferroni t critical value = 2.6029 (1 Tailed, alpha = 0.05, df = 9,76)

Title: MC Dead creek HA Chronic -Prarie vs D,E,F- D42 Neonates
File: pdefha2n Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	12664/5	16			
2	12549	8	3.3521	76.8	-0.7125
3	12550	8	3.3521	76.8	0.4000
4	12551	7	3.5081	80.4	0.8625
5	12609	8	3.3521	76.8	-5.1500
6	12610	7	3.5081	80.4	-0.2089
7	12611	8	3.3521	76.8	1.1625
8	12639	8	3.3521	76.8	-0.4875
9	12640	8	3.3521	76.8	0.5250
10	12641	8	3.3521	76.8	-0.4750

Title: MC Dead Creek HA Chonic - PDP vs Ref,B,C - D28s
File: pdprha8s Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	7.7720	28.0720	44.3120	28.0720	7.7720
OBSERVED	5	29	44	34	4

Chi-Square = 4.1040 (p-value = 0.3921)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: MC Dead Creek HA Chonic - PDP vs Ref,B,C - D28s
File: pdprha8s Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 31.3315 (p-value = 0.0001)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

Critical B = 20.0902 (alpha = 0.01, df = 8)
= 15.5073 (alpha = 0.05, df = 8)

Using Average Degrees of Freedom
(Based on average replicate size of 12.89)

Calculated B2 statistic = 30.7628 (p-value = 0.0002)

Data FAIL B2 homogeneity test at 0.01 level. Try another transformation.

Title: MC Dead Creek HA Chonic - PDP vs Ref,B,C - D28s
File: pdprha8s Transform: ARC SINE(SQUARE ROOT(Y))

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	1.2601				
2	12666	1.0103	131.00	147	12	*
3	12589	0.4453	85.00	147	12	*
4	12590	0.4544	85.50	127	11	*
5	12592	0.7827	130.50	147	12	*
6	12593	1.2294	171.00	127	11	
7	12546	1.3047	190.00	108	10	
8	12547	1.2314	208.50	147	12	
9	12548	1.2765	243.50	147	12	

Critical values are 1 tailed (k = 8)

```
Title:  MC Dead Creek HA Chronic - Prarie vs Ref,B,C - D28 G
File:          pdprha8g          Transform:          NO TRANSFORMATION

                  Shapiro - Wilk's Test for Normality
------------------------------------------------------------------------

     D =    1.5059
     W =    0.9172

     Critical W  = 0.9160 (alpha = 0.01 , N = 38)
              W  = 0.9380 (alpha = 0.05 , N = 38)

------------------------------------------------------------------------

Data PASS normality test (alpha = 0.01). Continue analysis.
```

Title: MC Dead Creek HA Chronic - Prarie vs Ref,B,C - D28 G
File: pdprha8g Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 27.7876 (p-value = 0.0005)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

Critical B = 20.0902 (alpha = 0.01, df = 8)
= 15.5073 (alpha = 0.05, df = 8)

Using Average Degrees of Freedom
(Based on average replicate size of 4.22

Calculated B2 statistic = 33.1901 (p-value = 0.0001)

Data FAIL B2 homogeneity test at 0.01 level. Try another transformation.

Title: MC Dead Creek HA Chronic - Prarie vs Ref,B,C - D28 G
File: pdprha8g Transform: NO TRANSFORMATION

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	0.5451				
2	12666	0.6135	32.00	11	4	
3	12589	0.2550	14.00	11	4	
4	12590	0.7233	22.00	6	3	
5	12592	0.3040	14.00	11	4	
6	12593	0.4807	14.00	6	3	
7	12546	0.7662	39.00	11	4	
8	12547	0.4555	21.00	11	4	
9	12548	0.6565	32.00	11	4	

Critical values are 1 tailed (k = 8)

Title: MC Dead Creek HA Chronic - Prarie vs Ref, B,C - D35 S
File: pdprha5s Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	5.2260	18.8760	29.7960	18.8760	5.2260
OBSERVED	4	18	38	13	5

Chi-Square = 4.4261 (p-value = 0.3514)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC Dead Creek HA Chronic - Prarie vs Ref, B,C - D35 S
File:          pdprha5s               Transform:      ARC SINE(SQUARE ROOT(Y))

                    Bartlett's Test for Homogeneity of Variance
----------------------------------------------------------------------------

Calculated B1 statistic = 27.4848               (p-value = 0.0006)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

----------------------------------------------------------------------------

Critical B = 20.0902  (alpha = 0.01, df =  8)
           = 15.5073  (alpha = 0.05, df =  8)

----------------------------------------------------------------------------

                        Using Average Degrees of Freedom
                   (Based on average replicate size of    8.67)

Calculated B2 statistic = 29.9957               (p-value = 0.0002)

Data FAIL B2 homogeneity test at 0.01 level. Try another transformation.
```

Title: MC Dead Creek HA Chronic - Prarie vs Ref, B,C - D35 S
File: pdprha5s Transform: ARC SINE(SQUARE ROOT(Y))

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	1.1701				
2	12666	0.9364	62.00	58	8	
3	12589	0.2731	36.00	58	8	*
4	12590	0.5041	46.50	58	8	*
5	12592	0.6857	54.00	58	8	*
6	12593	1.2339	110.50	58	8	
7	12546	1.2762	85.50	34	6	
8	12547	1.0760	76.50	58	8	
9	12548	1.1410	104.50	58	8	

Critical values are 1 tailed (k = 8)

Title: MC Dead Creek HA Chronic - Parie vs Ref,B,C - D42 S
File: pdprha2s Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	5.2260	18.8760	29.7960	18.8760	5.2260
OBSERVED	3	26	26	17	6

Chi-Square = 4.4215 (p-value = 0.3520)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: MC Dead Creek HA Chronic - Parie vs Ref,B,C - D42 S
File: pdprha2s Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 23.7121 (p-value = 0.0026)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

Critical B = 20.0902 (alpha = 0.01, df = 8)
= 15.5073 (alpha = 0.05, df = 8)

Using Average Degrees of Freedom
(Based on average replicate size of 8.67)

Calculated B2 statistic = 25.2070 (p-value = 0.0014)

Data FAIL B2 homogeneity test at 0.01 level. Try another transformation.

Title: MC Dead Creek HA Chronic - Parie vs Ref,B,C - D42 S
File: pdprha2s Transform: ARC SINE(SQUARE ROOT(Y))

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	1.1093				
2	12666	0.9567	73.00	58	8	
3	12589	0.2731	36.00	58	8	*
4	12590	0.5041	49.00	58	8	*
5	12592	0.6679	56.00	58	8	*
6	12593	1.1840	113.50	58	8	
7	12546	1.2017	85.00	34	6	
8	12547	1.0358	82.00	58	8	
9	12548	1.0753	102.50	58	8	

Critical values are 1 tailed (k = 8)

```
Title:  MC Dead Creek HA Chronic - Prarie vs Ref,B,C- D42 G
File:          pdprha2g                  Transform:                NO TRANSFORMATION

                Bartlett's Test for Homogeneity of Variance
----------------------------------------------------------------------

Calculated B1 statistic = 20.8588                   (p-value = 0.0075)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

----------------------------------------------------------------------

Critical B = 20.0902   (alpha = 0.01, df =  8)
           = 15.5073   (alpha = 0.05, df =  8)

----------------------------------------------------------------------

                    Using Average Degrees of Freedom
                (Based on average replicate size of     8.67)

Calculated B2 statistic = 19.7821                   (p-value = 0.0112)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.
```

Title: MC Dead Creek HA Chronic - Prarie vs Ref,B,C- D42 G
File: pdprha2g Transform: NO TRANSFORMATION

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	0.4221				
2	12666	0.4590	119.00	58	8	
3	12589	0.0839	39.00	58	8	*
4	12590	0.1951	51.00	58	8	*
5	12592	0.2344	45.50	58	8	*
6	12593	0.3483	80.00	58	8	
7	12546	0.5100	91.00	34	6	
8	12547	0.4895	126.00	58	8	
9	12548	0.4015	100.50	58	8	

Critical values are 1 tailed (k = 8)

Title: MC Dead Creek HA Chronic - Prarie vs Ref,B,C - D42 Neon
File: pdprha2n Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	5.2260	18.8760	29.7960	18.8760	5.2260
OBSERVED	1	19	42	10	6

Chi-Square = 12.7051 p-value = 0.0128)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC Dead Creek HA Chronic - Prarie vs Ref,B,C - D42 Neon
File:          pdprha2n               Transform:             NO TRANSFORMATION

Hartley's Test for Homogeneity of Variance
Bartlett's Test for Homogeneity of Variance
---------------------------------------------------------------------------

These two tests can not be performed because at least one group has
zero variance.

Data FAIL  to meet homogeneity of variance assumption.
Additional transformations are useless.

---------------------------------------------------------------------------
```

Title: MC Dead Creek HA Chronic - Prarie vs Ref,B,C - D42 Neon
File: pdprha2n Transform: NO TRANSFORMATION

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	12664/5	4.3625				
2	12666	2.2875	66.00	58	8	
3	12589	0.0000	36.00	58	8	*
4	125900	0.0750	37.00	58	8	*
5	12592	0.0000	36.00	58	8	*
6	12593	1.6250	61.50	58	8	
7	12546	11.4500	116.00	34	6	
8	12547	3.7250	95.00	58	8	
9	12548	3.3250	93.00	58	8	

Critical values are 1 tailed (k = 8)

Title: MC 99033 Chronic HA - Ref Borrow Pit to Borrow Pit Refs
File: 3641ha8s Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.0200	14.5200	22.9200	14.5200	4.0200
OBSERVED	5	12	20	23	0

Chi-Square = 10.0208 (p-value = 0.0401)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC 99033 Chronic HA - Ref Borrow Pit to Borrow Pit Refs
File:           3641ha6s                Transform:       ARC SINE(SQUARE ROOT(Y))

                Bartlett's Test for Homogeneity of Variance
----------------------------------------------------------------------------

Calculated B1 statistic =  7.8013                    (p-value = 0.0991)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

----------------------------------------------------------------------------

Critical B = 13.2767  (alpha = 0.01, df =  4)
           =  9.4877   alpha = 0.05, df =  4
```

Title: MC 99033 Chronic HA - Ref Borrow Pit to Borrow Pit Refs
File: 3641ha8s Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	4	0.2459	0.0615	2.3931
Within (Error)	55	1.4127	0.0257	
Total	59	1.6585		

(p-value = 0.0616)

Critical F = 3.6809 (alpha = 0.01, df = 4,55)
= 2.5397 (alpha = 0.05, df = 4,55)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: MC 99033 Chronic HA - Ref Borrow Pit to Borrow Pit Refs
File: 3641ha8s Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	12671	1.2175	0.8667		
2	12612	1.3108	0.9333	-1.4264	
3	12613	1.2425	0.8917	-0.3824	
4	12638	1.1555	0.8167	0.9464	
5	12614	1.3323	0.9500	-1.7549	

Dunnett critical value = 2.2300 (1 Tailed, alpha = 0.05, df [used] = 4,40)
(Actual df = 4,55)

Title: MC 99033 Chronic HA - Ref Borrow Pit to Borrow Pit Refs
File: 3641ha8s Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	12671	12			
2	12612	12	0.1095	12.4	-0.0667
3	12613	12	0.1095	12.4	-0.0250
4	12638	12	0.1095	12.4	0.0500
5	12614	12	0.1095	12.4	-0.0833

Title: MC Dead Creek Chronic HA - Borrown Pit - D28 G
File: 3641HA8g Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.1769
W = 0.9512

Critical W = 0.8680 (alpha = 0.01 , N = 20)
W = 0.9050 (alpha = 0.05 , N = 20)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: MC Dead Creek Chronic HA - Borrown Pit - D28 G
File: 3641HA8g Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 4.1758 (p-value = 0.3827)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 13.2767 (alpha = 0.01, df = 4)
= 9.4877 (alpha = 0.05, df = 4)

Title: MC Dead Creek Chronic HA - Borrown Pit - D28 G
File: 3641HA8g Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	4	0.0966	0.0242	2.0482
Within (Error)	15	0.1769	0.0118	
Total	19	0.2735		

(p-value = 0.1389)

Critical F = 4.8932 (alpha = 0.01, df = 4,15)
= 3.0556 (alpha = 0.05, df = 4,15)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: MC Dead Creek Chronic HA - Borrown Pit - D28 G
File: 3641HA8g Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	12671	0.4578	0.4578		
2	12612	0.5943	0.5943	-1.7776	
3	12613	0.6358	0.6358	-2.3180	
4	12638	0.5633	0.5633	-1.3739	
5	12614	0.4705	0.4705	-0.1660	

Dunnett critical value = 2.3600 (1 Tailed, alpha = 0.05, df = 4,15)

Title: MC Dead Creek Chronic HA - Borrown Pit - D28 G
File: 3641HA8g Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	12671	4			
2	12612	4	0.1812	39.6	-0.1365
3	12613	4	0.1812	39.6	-0.1780
4	12638	4	0.1812	39.6	-0.1055
5	12614	4	0.1812	39.6	-0.0128

```
Title:  MC Dead Creek Chronic HA - Borrow Pit - D35 S
File:          3641ha5s              Transform:      ARC SINE(SQUARE ROOT(Y))

                  Shapiro - Wilk's Test for Normality
-----------------------------------------------------------------------------

     D =    1.4376
     W =    0.9513

     Critical W   = 0.9190 (alpha = 0.01 , N = 40)
              W   = 0.9400 (alpha = 0.05 , N = 40)

-----------------------------------------------------------------------------

Data PASS normality test (alpha = 0.01). Continue analysis.
```

```
Title:  MC Dead Creek Chronic HA - Borrow Pit - D35 S
File:          3641ha5s               Transform:      ARC SINE(SQUARE ROOT(Y))

               Bartlett's Test for Homogeneity of Variance
---------------------------------------------------------------------------

Calculated B1 statistic =  1.0306                  (p-value = 0.9051)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

---------------------------------------------------------------------------

Critical B = 13.2767  (alpha = 0.01, df =  4)
           =  9.4877  (alpha = 0.05, df =  4)
```

Title: MC Dead Creek Chronic HA - Borrow Pit - D35 S
File: 3641ha5s Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	4	0.1592	0.0398	0.9691
Within (Error)	35	1.4376	0.0411	
Total	39	1.5968		

(p-value = 0.4367)

Critical F = 3.9082 (alpha = 0.01, df = 4,35)
= 2.6415 (alpha = 0.05, df = 4,35)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: MC Dead Creek Chronic HA - Borrow Pit - D35 S
File: 3641ha5s Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	12671	1.1937	0.8500		
2	12612	1.2320	0.8750	-0.3772	
3	12613	1.1279	0.8000	0.6493	
4	12638	1.0582	0.7375	1.3378	
5	12614	1.2076	0.8625	-0.1367	

Dunnett critical value = 2.2500 (1 Tailed, alpha = 0.05, df [used] = 4,30)
(Actual df = 4,35)

Title: MC Dead Creek Chronic HA - Borrow Pit - D35 S
File: 3641ha5s Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	12671	8			
2	12612	8	0.1880	21.7	-0.0250
3	12613	8	0.1880	21.7	0.0500
4	12638	8	0.1880	21.7	0.1125
5	12614	8	0.1880	21.7	-0.0125

```
Title:  MC Dead Creek HA Chronic - Borrow Pit - D42 S
File:          3641ha2s              Transform:      ARC SINE(SQUARE ROOT(Y))

                  Shapiro - Wilk's Test for Normality
-----------------------------------------------------------------------------

     D =    1.5486
     W =    0.9444

     Critical W  = 0.9190 (alpha = 0.01 , N = 40)
              W  = 0.9400 (alpha = 0.05 , N = 40)

-----------------------------------------------------------------------------

Data PASS normality test (alpha = 0.01). Continue analysis.
```

```
Title:  MC Dead Creek HA Chronic - Borrow Pit - D42 S
File:          3641ha2s                   Transform:      ARC SINE SQUARE ROOT(Y))

               Bartlett's Test for Homogeneity of Variance
-------------------------------------------------------------------------

Calculated B1 statistic =   1.6357                  (p-value = 0.8024)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

-------------------------------------------------------------------------

Critical B = 13.2767  (alpha = 0.01, df =  4)
           =  9.4877  (alpha = 0.05, df =  4)
```

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 S
File: 3641ha2s Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	4	0.1207	0.0302	0.6818
Within (Error)	35	1.5486	0.0442	
Total	39	1.6693		

(p-value = 0.6093)

Critical F = 3.9082 (alpha = 0.01, df = 4,35)
= 2.6415 (alpha = 0.05, df = 4,35)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 S
File: 3641ha2s Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	12671	1.1634	0.8250		
2	12612	1.1590	0.8250	0.0421	
3	12613	1.0727	0.7500	0.8628	
4	12638	1.0383	0.7250	1.1891	
5	12614	1.1727	0.8375	-0.0885	

Dunnett critical value = 2.2500 1 Tailed, alpha = 0.05, df [used] = 4,30
(Actual df = 4,35)

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 S
File: 3641ha2s Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	12671	8			
2	12612	8	0.2035	24.1	0.0000
3	12613	8	0.2035	24.1	0.0750
4	12638	8	0.2035	24.1	0.1000
5	12614	8	0.2035	24.1	-0.0125

```
Title:  MC Dead Creek HA Chronic - Borrow Pit - D42 G
File:          3641ha2g              Transform:              NO TRANSFORMATION

                    Shapiro - Wilk's Test for Normality
--------------------------------------------------------------------------

      D =    0.2110
      W =    0.7981

      Critical W  = 0.9190 (alpha = 0.01 , N = 40)
               W  = 0.9400 (alpha = 0.05 , N = 40)

--------------------------------------------------------------------------

Data FAIL normality test (alpha = 0.01). Try another transformation.

Warning    -  The first three homogeneity tests are sensitive to non-normality
              and should not be performed with this data as is.
```

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 G
File: 3641ha2g Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 12.0775 (p-value = 0.0168)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 13.2767 (alpha = 0.01, df = 4)
= 9.4877 (alpha = 0.05, df = 4)

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 G
File: 3641ha2g Transform: NO TRANSFORMATION

Steel's Many-One Rank Test - Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	DF	SIG 0.05
1	12671	0.3511				
2	12612	0.3804	74.00	47.00	8.00	
3	12613	0.4231	87.00	47.00	8.00	
4	12638	0.3904	73.00	47.00	8.00	
5	12614	0.3224	53.00	47.00	8.00	

Critical values are 1 tailed (k = 4)

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 Neonates
File: 3641ha2n Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 171.0025
W = 0.9663

Critical W = 0.9190 (alpha = 0.01 , N = 40)
W = 0.9400 (alpha = 0.05 , N = 40)

Data PASS normality test (alpha = 0.01). Continue analysis.

```
Title:  MC Dead Creek HA Chronic - Borrow Pit - D42 Neonates
File:          3641ha2n               Transform:            NO TRANSFORMATION

                  Bartlett's Test for Homogeneity of Variance
---------------------------------------------------------------------------

Calculated B1 statistic =  1.5641               (p-value = 0.8152)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

---------------------------------------------------------------------------

Critical B = 13.2767  (alpha = 0.01, df =  4)
           =  9.4877  (alpha = 0.05, df =  4)
```

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 Neonates
File: 3641ha2n Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	4	14.9375	3.7344	0.7643
Within (Error)	35	171.0025	4.8858	
Total	39	185.9400		

(p-value = 0.5556)

Critical F = 3.9082 (alpha = 0.01, df = 4,35)
= 2.6415 (alpha = 0.05, df = 4,35)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 Neonates
File: 3641ha2n Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	12671	3.4125	3.4125		
2	12612	4.0750	4.0750	-0.5994	
3	12613	4.1750	4.1750	-0.6899	
4	12638	4.2750	4.2750	-0.7804	
5	12614	5.3125	5.3125	-1.7192	

Dunnett critical value = 2.2500 (1 Tailed, alpha = 0.05, df [used] = 4,30)
(Actual df = 4,35)

Title: MC Dead Creek HA Chronic - Borrow Pit - D42 Neonates
File: 3641ha2n Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	12671	8			
2	12612	8	2.4867	72.9	-0.6625
3	12613	8	2.4867	72.9	-0.7625
4	12638	8	2.4867	72.9	-0.8625
5	12614	8	2.4867	72.9	-1.9000

Aquatec Biological Sciences
Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION

Name: Menzie Cura & Associates
Address: One Courthouse Lane, Suite 2
Chelmsford, MA 01824
Telephone: (978) 453-4300
Facsimile: (978) 453-7260
Contact Name: Ken Cerrelo, Ph.D.

COMPANY'S PROJECT INFORMATION

Project Name: Dead Creek Sediment Tox
Project Number: 99033
Sampler Name(s): ____
Quote #: 3/99 Client Code: MENCUR

SHIPPING INFORMATION

Carrier: ____
Airbill Number: ____
Date Shipped: ____
Hand Delivered: ___Yes ___No

VOLUME/CONTAINER TYPE/ PRESERVATIVE

4°C
plastic
1 gal

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX-C-1	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.4				
BTOX-C-1-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.4				
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth Moreto	10/4/99	17:00	Karen Dawley
	10/5/99	10:00	

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: _____ °C

3 Coolers

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Page of

Aquatec Biological Sciences

Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 0540
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE/PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4°C
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453 4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453 7260			
Contact Name: Ken Cerreto, Ph.D.	Quote #: 3/99 Client Code: MENCUR	Hand Delivered: Yes No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS				
BTOX-C-3-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth *Hyalella azteca* 42 day Chronic Toxicity *Chironomus tentans* 10 d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0?			
BTOX-D-3	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth *Hyalella azteca* 42 day Chronic Toxicity *Chironomus tentans* 10 d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0?			
BTOX-D-3-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth *Hyalella azteca* 42 day Chronic Toxicity *Chironomus tentans* 10 d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0?			
BTOX-C-2-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth *Hyalella azteca* 42 day Chronic Toxicity *Chironomus tentans* 10 d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0?			
BTOX-C-2	10/4			✓	Sediment	*Hyalella azteca* 10 d Survival & Growth *Hyalella azteca* 42 day Chronic Toxicity *Chironomus tentans* 10 d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0?			

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth M. Cerreto	10/4/99	17:00	
Relinquished by: (signature)	DATE	TIME	Received by: (signature)
	10/5/99	10:00	Karen Downey
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ______°C

3 Coolers

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Aquatec Biological Sciences
Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE/ PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4°C
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453-4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453-7260			
Contact Name: Ken Cerreto, Ph.D.	Quote #: 3/99 Client Code: MENCUR	Hand Delivered: ___Yes ___No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX-D-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-D-2-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-D-1	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX D 1-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-C-3	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth M. Cerreto	10/4/99	19:00	
Relinquished by: (signature)	DATE	TIME	Received by: (signature)
	10/5/99	10:00	Karen Downey
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery:_____°C

3 Coolers

620079

Serial Number 137910

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

Aquatech Colchester, VT

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

[In two (2) coolers]

5102 LaRoche Avenue, Savannah, GA 31404	Phone (912) 354-7858	Fax (912) 352-0165
2846 Industrial Plaza Drive, Tallahassee, FL 32301	Phone (904) 878-3994	Fax (904) 878-9504
414 SW 12th Avenue, Deerfield Beach, FL 33442	Phone (954) 421-7400	Fax (954) 421-2584
900 Lakeside Drive, Mobile, AL 36693	Phone (334) 666-6633	Fax (334) 666-6696
6712 Benjamin Road, Suite 100, Tampa, FL 33634	Phone (813) 885-7427	Fax (813) 885-7049
100 Alpha Drive, Suite 110, Destrehan, LA 70047	Phone (504) 764-1100	Fax (504) 725-1163

PROJECT REFERENCE: Sanger Area II
PROJECT NO.: 6788
P.O. NUMBER:
PROJECT LOC. (State): IL
SAMPLER(S) NAME: C. Menzie, K. Fogarty
PHONE: 978-453-4300
FAX: 978-453-7260
CLIENT NAME: Menzie-Cura Solution
CLIENT PROJECT MANAGER: C. Menzie
CLIENT ADDRESS (CITY, STATE, ZIP): 1 Courthouse Lane Suite 2 Chelmsford MA

MATRIX TYPE

REQUIRED ANALYSES

PAGE 1 of 1

STANDARD REPORT DELIVERY [X]

EXPEDITED REPORT DELIVERY (surcharge)

Date Due

SAMPLE DATE	SAMPLE TIME	SL NO.	SAMPLE IDENTIFICATION	MATRIX	NUMBER OF CONTAINERS SUBMITTED	REMARKS
10/5/99	9:45		B10X-B-1	X	2	
10/5/99	9:45		B10X-B-1 (Dupe)	X	2	
10/5/99	11:10		B10X-B-2	X	2	
10/5/99	7:00		B10X-B-3	X	2	
10/5/99	13:40		B10X-M	X	2	

Cooler Temp 1.2°C (large cooler)
Cooler Temp = 0.5°C (small cooler)

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Katherine O. Fogarty	10/5/99	1725						
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Karen Dixey	10/6/99	10:00						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SL LOG NO.	LABORATORY REMARKS:
			☐ YES ☐ NO			

CHAIN OF CUSTODY RECORD

Project No.	Project Name:	Project Location:
648B	Sauget Area I - Dead Creek	Sauget/Cahokia Ill

DATE: 10/6/99

SAMPLERS: C Menzie, K Fogarty

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

Analyses Required

SAMPLE ID	Date	Comp.	Time Grab	Station Locations	No. of Containers	Bioassay see note (1)					NOTES
E-1	10/6/99	✓	9:50	Dead Creek-Sed. E	2	X					
E-2		✓	9:05	↓	2	X					
E-3		✓	12:10	↓	2	X					
BP-1			11:30	Borrow Pit	2	X					
BP1(Dupe)			11:30	↓	2	X					
BP-3	↓		16:30	↓	2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Kathleen C. Fogarty	10/6/99	1900	Karen Downey	10/7/99	10:00
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Note (1) H. azteca/ C. tentans acute/ chronic sediment toxicity tests

Laboratory: Aquatech

Phone:

Contact Person: Phil. Downey

Via Fedex in 3 coolers

Cooler #1 Temp = 3.1°C - B3 + E3
Cooler #2 Temp = 3.2°C - BP1 + BP1-Dup
Cooler #3 Temp = 2.5°C - E1 + E2

1000003

CHAIN OF CUSTODY RECORD

MENZIE-CURA & ASSOCIATES, INC
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX 978/453-7260

Project No.	Project Name	Project Location
648 B	Dead Creek Sauget Area I	Sauget/Cahokia, Ill

DATE 10/1/99

SAMPLERS C. Menzie, K. Fogarty

Analyses Required

SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	Analyses Required					NOTES
[illegible]	10/1/99	9:30		Cammoro Pd	2	X					C1 C1
	↓	10:00		Dead Creek, Control	2	X					C2 C2
		10:00		↓ ↓	2	X					C1 C2
	↓	10:15			2	X					C1 C2

Cooler 1 2.3°C
Cooler 2 2.2°C

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine A Fogarty	10/1/99	1100	Phil Downey	10/2/99	10:30
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Sent in 2 coolers via Fedex

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

000383

CHAIN OF CUSTODY RECORD

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

Project No.: 648B

Project Name: Dead Creek - Sauget Area I

Project Location: Sauget-Cahokia, Ill.

DATE: 10/8/99

SAMPLERS: C. Menzie, K. Fogarty

Analyses Required

SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	Chironomus tentans					NOTES
P.DC-1	10/8/99	9:30		Prairie du Pont Creek	2	X					
P.DC-2	↓	11:20		" " "	2	X					
Ref2-1	↓	16:20		Ref. Creek	2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fogarty	10/8/99	18:30			
Relinquished By: (Signature)	10/9/99	10:30	Received By: (Signature) J. Gallbrait		
Relinquished By: (Signature)			Received By: (Signature)		

Remarks:
2 coolers via Fedex
Shipping bill No
811399409571

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

Cooler Temp #1 1°C
#2 3.1°C

000003

CHAIN OF CUSTODY RECORD

Project No	Project Name	Project Location:
6/8 B	Dead Creek Sauget Area I	Sauget / Cahokia, Ill.

MENZIE-CURA & ASSOCIATES, INC
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

DATE 10/9/99

SAMPLERS C. Menzie, K. Fozonty

Analyses Required

	SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	[illegible]				NOTES
[illegible]	Ref a-2	10/9/99	10:30	✓	Reference Borrow Pit	2	✓				

[illegible]

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fozonty	10/9/99	12:30			
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Sent via US Air Counter to Counter

Laboratory: Aquatech

Phone:

Contact Person: Phil Dorney

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: October 19, 1999	Day 28: November 16, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12546	A	10	RB	—	—	10 RB	-	-	-
	B	10	JG	—	—	10	-	-	-
	☆ C	0	RB	0	RB	0	-	-	-
	☆ D	18	JG	—	—	18	-	-	-
	E	9	JG	—	—	9	-	-	-
	F	10	TM	—	—	10	-	-	-
	G	9	TM	—	—	9	-	-	-
	H	10	JG	—	—	10	-	-	-
	I	10	RB	—	—	10	10	24.59	32.33
	J	7	JG	0		7	7	24.35	30.13
	K	9	JG	—	—	9	9	25.41	31.88
	L	9	JG	—	—	9	9	26.86	33.57
12547	A	10	RB	—	—	10	-	-	-
	B	9	RB	—	—	9	-	-	-
	C	9	RB	—	—	9	-	-	-
	D	10	TM	—	—	10	-	-	-
	E	8	TM	—	RB	8	-	-	-
	F	10	TM	—	—	10	-	-	-
	G	9	JG	—	—	9	-	-	-
	H	7	RB	—	RB	7	-	-	-
	I	9	JG	—	—	9	9	23.55	27.42
	J	9 +1 dead	JG	—	—	9	9	22.65	27.97
	K	5	RB	0		5	5	23.08	24.94
	L	10	TM	—	—	10	10	24.60	28.89
12548	A	10	TM	—	—	10	-	-	-
	B	10	RB	—	—	10	-	-	-
	C	✳ 3	JG	—	—	3	-	-	-
	D	10	RB	—	—	10	-	-	-
	E 1 dead	9	RB	—	—	9	-	-	-
	F	9	JG	—	—	9	-	-	-
	G	10	RB	—	—	10	-	-	-
	H	10	JG	—	—	10	-	-	-
	I	10	TM	—	—	10	10	28.70	32.94
	J	8	TM	0		8	8	24.16	30.91
	K	9	RB	—	—	9	9	~~27.33~~ 25.95	33.38
	L	10	TM	—	—	10	10	25.52	30.84

Balance QC: Initial (20 mg = 19.98) fm Final (20 mg = 19.98) Balance Asset #:

Date/time In 11/28 16:00 Temp(°C) 80° C Init. TM Date/time out 16:10 11/29 Temp(°C) 81° Init. TM

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

✳ Fungal growth on top of sediment; also a dead ~~Tipulidae~~ Diptera (Stationary) found. JG 11/16

Reviewer: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

☆ zero found in rep C but 20 in rep D - maybe in[illegible]

0002285[illegible]

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: October 19, 1999	Day 28: November 16, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12549	A	10	JG	—	—	10	- -	-	-
	B	9	RB	—	—	9	-	-	-
	C	8	RB	0	JG 11/17	8	-	-	-
	D	10	JG	—	—	10	-	-	-
	E	10	RB	—	—	10	-	-	-
	F	10	TM	—	—	10	-	-	-
	G	9	JG	—	—	9	-	-	-
	H	8	TM	0	RB 11/17	8	-	-	-
	I	9	TM	—	—	9	9	24.64	29.75
	J	8	JG	0		8	8	27.33	30.71
	K	7	JG	0		7	7	29.10	33.68
	L	9	RB	—	—	9	9	25.92	31.69
12550	A	6	JG	—	—	6	-	-	-
	B	10	JG	—	—	10	-	-	-
	C	7	RB	0	JG 11/17	7	-	-	-
	D	7	RB	0	RB 11/17	7	-	-	-
	E	10	RB	—	—	10	-	-	-
	F	11	JG	—	—	11	-	-	-
	G	10	RB	—	—	10	-	-	-
	H	7	JG	—	—	7	-	-	-
	I	10	RB	—	—	10	10	26.35	32.15
	J	8	JG	0		8	5 (#1)	21.83	27.15
	K	9	TM	—	—	9	9	26.99	31.65
	L	9	JG	—	—	9	9	27.82	32.99
12551	A	10	JG	—	—	10	-	-	-
	B	9	TM	—	—	9	-	-	-
	C	* 20	JG	—	—	20	-	-	-
	D	10 JG	RB	—	—	10	-	-	-
	E	~~9~~ 6	JG	—	—	6	-	-	-
	F	9	JG	—	—	9	-	-	-
	G	7	TM	0	RB 11/17	7	-	-	-
	H	8	JG	—	—	8	-	-	-
	I	6	TM	0		6	6	24.97	28.64
	J	9	TM	—	—	9	9	23.15	29.29
	K	6	TM	0		6	6	24.90	29.85
	L	8	RB	0		8	8	22.98	29.41

(#1) 3 missing from vial TM 11/28

Balance QC: Initial (20 mg = 19.98) Final (20 mg = 19.98) Balance Asset #:

Date/time In 11/28 16:00 Temp(°C) 80°C Init. TM Date/time out 11/29 16:10 Temp(°C) 82 Init. TM

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

* May have had 10 extra amphipods added. JG 11/16

Reviewer: [signature] Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000086

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: October 19, 1999	Day 28: November 16, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12552	A	8	TM	0	JG 11/17	8	-	-	-
	B 2nd	2	RB	0	JG 11/17	2	-	-	-
	C	8	RB	0	JG 11/17	8	-	-	-
	D	7	TM	0	RB 11/17	7	-	-	-
	E	5	RB	0	JG 11/17	5	-	-	-
	F	5	JG	0	RB 11/17	5	-	-	-
	G	8	TM	0	RB 11/17	8	-	-	-
	H	7	RB	0	RB 11/17	7	-	-	-
	I	4	TM	0		4	4	24.28	26.97
	J	3	RB	0		3	3	23.53	26.46
	K	4	TM	0		4	4	24.62	29.45
	L	5	JG	0		5	5	29.02	34.38

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A						-	-	-
	B						-	-	-
	C						-	-	-
	D						-	-	-
	E						-	-	-
	F						-	-	-
	G						-	-	-
	H						-	-	-
	I								
	J								
	K								
	L								

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
	A						-	-	-
	B						-	-	-
	C						-	-	-
	D						-	-	-
	E						-	-	-
	F						-	-	-
	G						-	-	-
	H						-	-	-
	I								
	J								
	K								
	L								

Balance C.C. Initial (20 mg = 19.98) Final (20 mg = 19.95) Balance Asset #:

Date/time In 11/23 [illegible] Temp(°C) 80° Init. TM Date/time out 29 [illegible] Temp(°C) 51 Init. TM

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

Reviewer [signature] Date 12/21/99

haday28.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: 10/19/99	Test End: 11/30/99

		Day 35 (11/23/99)		Day 42 (11/30/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12546	A	10	23	8	6	2	36	JG ~~10~~ 8	28.18	31.05
	B	9	7	8	4	4	29	JG ~~9~~ 8	20.34	25.10
*	C	—	—	—	—	—	—	—	—	—
	D	17	24	16	8	8	17	16	25.3~~8~~8 JG	30.14
	E	9	42	9	5	4	43	9	26.73	31.54
	F	9	33	9	5	4	24	9	27.01	32.19
	G	9	30	9	6	3	27	9	25.62	30.00
	H	9	29	9	4	5	19	9	25.41	29.99
12547	A	10	2	10	7	3	22	10	27.35	31.58
	B	8	15	8	6	2	0	8	25.57	29.03
	C	~~24~~ 8 TM	24	8	5	3	0	8	25.71	29.40
	D	7	14	6	2	4	0	6	26.73	30.84
	E	~~4~~ 5 TM	0	4	1	3	0	4	22.82	24.43
	F	8	6	8	4	4	14	8	25.13	28.53
	G	8	4	7	4	3	5	7	27.92	30.92
	H	7	8	7	5	2	16	7	25.67	30.27
12548	A	10	18	9	5	3	10	8	24.82	28.39
	B	10	21	10	6	4	13	10	25.63	29.04
	C	1	0	1	0	1	0	1	26.58	27.01
	D	10	13	9	5	4	18	9	23.71	26.68
	E	8	1	8	4	4	11	8	28.19	31.48
	F	JG ~~6~~ 8	5	8	2	6	1	8	24.61	27.73
	G	9	17	11	9	2	26	11 JG	29.62	34.23
	H	8	5	6	3	3	7	~~5~~ 6	24.53	26.75
12549	A	10	16	10	5	5	15	16	27.07	30.78
	B	9	5	8	2	6	5	8	27.18	30.89
	C	7	23	8	5	3	21	8	25.91	29.66
	D	8	1	7	2	5	6	7	26.48	29.52
	E	RB ~~8~~ 9	9	9	6	2	9	9	25.11	28.36
	F	9	14	9	5	4	16	9	24.96	28.37
	G	~~10~~ 9	4	9	4	5	6	9	28.80	32.37
	H	7	1	7	5	2	27	7	26.55	29.60

Day 35 Initials / Date: RB 11/23 TM	Day 42 Initials / Date: 11/30/99 TM JG

Balance QC: Initial (20 mg = 20.01) Final (20 mg = 19.96 / 19.96) Balance Asset #:
start / finish

Date/time In 11/30 16:40 Temp(°C) 82 Init. JG Date/time out 16:30 12/1 Temp(°C) 79° Init. TM

Reviewer: JG Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000038

* see day 28 data

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3615
	Test Start: 10/19/99	Test End: 11/30/99

		Day 35 (11/23/99)		Day 42 (11/30/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12550	A	6	11	5	2	3	8	5	23.82	26.51
	B	10	17	10	7	3	18	10	23.93	28.05
	C	7	3	6	2	4	3	6	21.63	24.42
	D	7	3	7	5	2	18	7	21.47	24.02
	E	10	0	10	5	5	9	10	22.04	25.98
	F	11	2	10	5	5	0	10	27.01	31.05
	G	10	4	10	6	4	7	10	25.41	29.37
	H	7	1	7	5	2	29	7	27.51	30.67
12551	A	10	16	10	7	3	7	10	23.66	27.37
	B	8	7	9	5	4	21	9	22.74	26.67
	C	19	4	~~8~~ 19 jm	~~2~~ 15 jm	~~2~~ jm 4	22	19	22.84	26.97
	D	9	3	9	8	1	14	9	27.84	31.09
	E	6	1	5	3	2	5	5	27.37	29.21
	F	8	7	8	6	2	12	8	27.92	31.04
	G	6	10	6	3	3	9	6	22.35	24.94
	H	8	1	8	3	5	5	8	27.31	30.82
12552	A	7	0	7	3	4	0	7	21.20	23.07
	B	0	0	—	—	—	—	—	—	—
	C	6	0	6	1	5	0	6	26.72	28.36
	D	6	3	6	3	3	0	6	26.56	27.95
	E	5	1	4	2	2	6	4	25.01	26.19
	F	5	0	4	4	0	0	4	27.23	28.16
	G	5	0	3	2	1	0	3	28.10	28.79
	H	7	2	7	4	3	0	7	26.31	28.55
	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									

Day 35 Initials / Date: 11/23 JM Day 42 Initials / Date: 11/30 JM JG

Balance QC. Initial (20 mg =) Final (20 mg =) Balance Asset #:

Date/time In Temp(°C) Init. Date/time out 16:30 12/1 Temp(°C) 79° Init. JM

Reviewer: [signature] Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Hyalella aztec, Chronic
Initial Weight Results
10/19/99

Menzie Cura
Dead Creek
99033

BTR 3615
Aquatec Biological Sciences

Initial Dry Weight Data					
Replicate	# Weighed	*Initial Boat* Weight (mg)	*Final Dry* Weight (mg)	*Mean Wt.* within Rep (mg)	*Mean Wt.* Reps I-L (mg)
1	10	34.93	36.75	0.182	
2	10	39.47	41.06	0.159	
3	10	33.28	35.05	0.177	
4	10	31.92	33.69	0.177	
5	10	35.86	37.65	0.179	
6	10	31.28	33.01	0.173	
7	10	36.13	37.90	0.177	
8	10	40.46	42.30	0.184	0.176

Hyalella azteca Initial Dry Wt.

Project: H.a. 10/19 Chronic		
Culture ID: 10/12	Age: 7d	

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)
1	10	34.928	36.75
2	10	39.472	41.06
3	10	33.278	35.05
4	10	31.922	33.69
5	10	35.857	37.65
6	10	31.276	33.01
7	10	36.129	37.90
8	10	~~[illegible]~~ 40.456	42.30
Initials:			
Date:			

Balance QC: Initial (20 mg = 19.96)	Final (20 mg = 19.96)	Balance Asset #:		
Date/time In 12/4 10:50	Temp(°C) 82°C	Init. 93	Date/time out 12/5 12:00 Temp(°C) 80	Init. 73
Comments:				

Reviewer [signature] Date 12/22/99

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Laboratory: Aquatec Biological Sciences South Burlington, Vermont

Organism Holding and Acclimation

Species: *Hyalella azteca*	Date Received: 10/15/99 No. Rec. 900
Supplier: ARO	Hatch Date: 10/12/99
Apparent Conditon: Excellent	Culture ID: 10/12

Acclimation / Holding Procedures: Transfer to holding culture boxes, add laboratory water. Acclimate to water to be used for testing (sediment overlying water formulation). Aerate lightly. Water change once (50%) weekly.
Daily Feeding: 1:1 mix of *Selenastrum* / YCT, 1-3 mL (maintain hint of green algal coloration on culture box bottom). Also, pinch of ground Tetrafin/Ceraphyll. Do not allow excess food/fungus to accumulate.
Monitoring: Examine over a light box daily, record apparent condition. Temperature daily; pH, D.O, on Mon., Weds., Fri., (miniumum). Conductivity weekly.
Test starts: record date, time, initials for sediment test and SRT test starts.

1999 Date	Fed	Temp	pH	D.O.	Cond uct.			Water Chg.	Age (Days)	Init.
10/15	YCT Sel TC	15.7						Added 1:1	3	JG
10/16	YCT Sel	22.7							4	JG
10/17	YCT Sel.	22.2	8.1	8.3	1,000				5	JG
10/18	Tetrafin	22.4						Added	6	JG
10/19	[illegible]	22.9	8.0	8.5	800				7	JB
10/20									8	

* N = normal, appear healthy. Record # dead if any observed.

Sediment test start (Date/time/Init.) 10/19/99 18:00 JG SRT test start: (Date/time/init.) ________.

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared ______ Field collected ______

Hatch date 10/12/99 Receipt date ______

Lot number 101299 HA Strain ARO

Brood Origination USFWS MO

II. Water Quality

Temperature 24 °C Salinity — ppt DO 7.6

pH 7.4 Hardness ≈180 ppm

III. Culture Conditions

System: FW STATIC renewal

Diet: Flake Food ✓ Phytoplankton ______ Trout Chow ✓

Brine Shrimp ______ Rotifers ______ Other ______

Prophylactic Treatments: ______

Comments: < 24 HRS OLD AT COLLECTION

IV. Shipping Information

Client: AQUATECH BIOLOGICAL # of Organisms: 900+

Carrier: FED EX Date Shipped: 10/14/99

Rec'd 10/15 JG
10:15
T = 15.7°C ✓
pH = 7.3
DO = 7.20
Hard = 130.0

Biologist: [signature]

10/16
Temp = 22.7°C
FED - JG

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

000033

Added Sed. Recon. H_2O

FED VCT/Sel/TC

10/17 JG
T = 22.2°C
pH = 8.1
DO = 8.3

FED

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12546	T (°C)	23.1	22.5	22.4	21.6 / 21.4	22.6 / 22.5	22.3 / 22.2	21.7 / 21.2	22.8 / 22.6	22.4 / 22.7	21.9 / 22.4	22.9 / 22.6
	pH	7.8	—	—	7.7	—	—	7.6	—	7.7		7.7
	DO (mg/L)	7.2	~~6.4~~ 7.0	7.0	6.2	—	—	6.1		5.9		5.8
	Conductivity	450	X	X	X	X	X	X	300	X	X	X
12547	T (°C)	23.2	22.2	22.3								22.7 / 22.7
	pH	7.6	—	—	7.5	—	—	7.5		7.5		7.5
	DO (mg/L)	6.5	5.~~3~~9	5.5	5.1	—	—	5.4		5.2		5.7
	Conductivity	430	X	X	X	X	X	X	310	X	X	X
12548	T (°C)	23.4	22.~~2~~0	22.4								22.1 / 22.0
	pH	7.7	—	—	7.6	—	—	7.5		7.5		7.5
	DO (mg/L)	6.2	~~5.7~~ 6.4	6.0	5.3	—	—	5.7		5.5		5.2
	Conductivity	400	X	X	X	X	X	X	300	X	X	X
12549	T (°C)	23.2	22.~~1~~2	22.2								22.7 / 23.0
	pH	7.8	—	—	7.7	—	—	7.8		8.0		8.2
	DO (mg/L)	6.8	~~6.3~~ 7.1	6.7	6.2	—	—	6.4		6.0		5.8
	Conductivity	390	X	X	X	X	X	X	290	X	X	X
	Init./Date (1999):	10/19	10/20	10/21 JG	10/22 JM	10/23 JG	10/24 JG	10/25	10/26 JM	10/27 JM	10/28 JM	10/29

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of test.~~ 28

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000094

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12550	T (°C)	22.3	22.6	22.5								22.7 / 22.6
	pH	7.9	—	—	7.7	—	—	7.8	~~7.8~~	7.8		8.0
	DO (mg/L)	7.3	6.9	7.0	6.5	—	—	6.6	~~5.7~~	5.7		5.7
	Conductivity	380	X	X	X	X	X	X	290	X	X	X
12551	T (°C)	22.7	22.2	22.0								22.9 / 22.5
	pH	7.9	—	—	7.8	—	—	7.8	~~7.9~~	7.9		8.1
	DO (mg/L)	6.4	7.8	6.7	6.5	—	—	6.1	~~5.8~~	5.8		5.8
	Conductivity	380	X	X	X	X	X	X	300	X	X	X
12552	T (°C)	22.0	22.5	22.1								22.9 / 23.2
	pH	7.6	7.7	-	7.8	—	—	7.9		7.9		7.9
	DO (mg/L)	8.7	~~7.9~~	7.5	7.4	—	—	7.5		7.4		6.7
	Conductivity	420	X	X	X	X	X	X	300	X	X	X
~~12549~~	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	Init./Date (1999):	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of test~~. 28

Review: ______ Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000035

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates		Project: 99033 Dead Creek						BTR: 3615 Test Start . 10/19/99				
		Day of Analysis										
Sample	**Parameter**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
12546	T (°C)	22.8/22.6	22.7/23.0	23.5/23.1	22.3/22.7	22.8/23.8	23.2/22.1	22.6/23.1	22.7/21.8	21.9/21.7	22.3/22.4	22.4/22.1
	pH	—	—	6.9		7.8	—	7.8			7.6	
	DO (mg/L)	—	—	7.3		6.5	—	6.4			6.6	
	Conductivity A+H	X	X	X	310 ✓	X	X	X	X	X	310 ✓	X
12547	T (°C)	22.2/22.3										
	pH	—	—	7.4		7.6	—	7.6			7.4	
	DO (mg/L)	—	—	7.0		6.2	—	6.4			6.4	
	Conductivity A+H	X	X	X	320 ✓	X	X	X	X	X	310 ✓	X
12548	T (°C)	22.0/21.8										
	pH	—	—	7.5		7.5	—	7.5			7.5	
	DO (mg/L)	—	—	7.3		5.9	—	6.1			6.7	
	Conductivity A+H	X	X	X	320 ✓	X	X	X	X	X	320 ✓	X
12549	T (°C)	22.6/23.1										
	pH	—	—	7.9		7.7		7.7			7.6	
	DO (mg/L)	—	—	7.2		6.4		6.8			6.7	
	Conductivity A+H	X	X	X	320 ✓	X	X	X	X	X	320 ✓	X
	Init./Date (1999):	10/30 JG	10/31 JG	11/1 JG	11/2 JM	11/3 JG	11/4 [illegible]	11/5 [illegible]	11/6 JG	11/7 JM	11/8 JG	11/9 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of test.~~ 28 JG

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000036

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

		Day of Analysis										
Sample	**Parameter**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
12550	T (°C)	22.7 / 22.5										
	pH	—	—	7.8		7.7		7.7			7.7	
	DO (mg/L)	—	—	7.1		7.2		6.3			6.5	
	Conductivity	X	X	X	320 ✓	X	X	X	X	X	320 ✓	X
12551	T (°C)	22.4 / 22.6										
	pH	—	—	8.0		7.9		7.8			7.7	
	DO (mg/L)	—	—	6.9		7.0		6.3			6.3	
	Conductivity	X	X	X	335 ✓	X	X	X	X	X	340 ✓	X
12552	T (°C)	23.1 / 23.2										
	pH	—	—	7.9		7.9		7.8			7.8	
	DO (mg/L)	—	—	7.9		7.2		7.4			7.2	
	Conductivity	X	X	X	320 ✓	X	X	X	X	X	320 ✓	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	Init./Date (1999):	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of test.~~ 28

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
		Day of Analysis										
12546	T (°C)	22.7/22.9	22.1/21.4	22.4/22.0	22.6/22.7	22.2/21.9	22.1/22.2	22.3/22.9	22.8/22.9	23.5/23.4	23.3/24.2	23.2/23.4
	pH	7.6		7.7			7.6	7.5	~~7.9~~ ①		7.9	
	DO (mg/L)	5.9		7.0			6.8	6.3	~~7.8~~		7.8	
	Conductivity	X	X	X	X	X	X	325	X	X	290	X
12547	T (°C)					22.5/22.7						
	pH	7.5		7.6			7.5	7.4	① ~~7.8~~		7.8	
	DO (mg/L)	6.0		7.3			6.9	6.1	~~7.9~~		7.9	
	Conductivity	X	X	X	X	X	X	310	X	X	X 310	X
12548	T (°C)											
	pH	7.5		7.6			7.6	7.5	① ~~7.8~~		7.9	
	DO (mg/L)	5.4		7.4			6.8	5.8	~~7.9~~		7.9	
	Conductivity	X	X	X	X	X	X	320	X	X	X 310	X
12549	T (°C)											
	pH	7.7		7.7			7.7	7.7	① ~~7.9~~		7.9	
	DO (mg/L)	6.2		7.3			7.0	6.4	~~7.9~~		7.9	
	Conductivity	X	X	X	X	X	X	310	X	X	X 320	X
	Init./Date (1999):	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21, 28, 35, and end of test~~. 28 JT

① entered on wrong day

Review: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000038

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

Sample	Parameter	Day of Analysis 22	23	24	25	26	27	28	29	30	31	32
12550	T (°C)									23.5		
	pH	7.7		7.7		7.7	~~7.7~~	7.7			7.9	
	DO (mg/L)	6.1		7.0		7.5		6.8			7.9	
	Conductivity	X	X	X	X	X	X	300	X	X	300	X
12551	T (°C)											
	pH	7.7		7.8		7.8		7.7			7.9	
	DO (mg/L)	5.8		7.0		7.0		6.1			7.9	
	Conductivity	X	X	X	X	X	X	320	X	X	X 300	X
12552	T (°C)											
	pH	7.9		7.9		7.9	~~7.8~~	7.8			7.9	
	DO (mg/L)	7.4		7.8		7.6		7.6			7.8	
	Conductivity	X	X	X	X	X	X	300	X	X	X 3[illegible]	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	Init./Date (1999):	11/10 [illegible]	11/11 JM	~~11/12~~ JG	11/13 JG	11/14 JM	11/15 JG	11/16 CA	11/17 CA	11/18 CA	11/19 CA	11/20

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21,~~ 28, ~~35, and end of test~~.

Review: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

		Day of Analysis										
Sample	Parameter	33	34	35	36	37	38	39	40	41	42	
12546	T (°C)	23.3/23.5	23.2/23.5	23.4/23.4	23.3/24.1	23.7/23.6	22.8/22.7	22.3/22.4	22.5/22.2	22.6/22.5	22.3/22.1	
	pH		8.0	7.9			7.9			8.0	7.7	
	DO (mg/L)		8.2	8.2			8.2			8.5	7.8	
	Conductivity AH/Amm	X	X	280	X	X	X	X	X	X	270	
12547	T (°C)											
	pH		8.0	7.9			7.9			7.9	7.6	
	DO (mg/L)		8.1	8.0			8.2			8.4	7.5	
	Conductivity AH/Amm	X	X	290	X	X	X	X	X	X	280	
12548	T (°C)											
	pH		8.0	7.9			7.8			7.9	7.7	
	DO (mg/L)		8.2	7.9			8.2			8.4	7.7	
	Conductivity AH/Amm	X	X	290	X	X	X	X	X	X	280	
12549	T (°C)											
	pH		8.0	7.9			7.8			7.9	7.7	
	DO (mg/L)		8.2	7.7			8.3			8.5	7.8	
	Conductivity AH/Amm	X	X	300	X	X	X	X	X	X	270	
	Init./Date (1999):	11/21 JM	11/22 JG	11/23	11/24	11/25 JM	11/26	11/27 JG	11/28 JM	11/29 JG	11/30 JM	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21~~, 28, ~~35, and end of test~~.

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	
		Day of Analysis										
12550	T (°C)											
	pH		8.0	7.9			7.8			7.8	7.7	
	DO (mg/L)		8.2	7.8			8.3			8.4	7.8	
	Conductivity H+H/Amm	X	X	[illegible]	X	X	X	X	X	~~X JM~~	280	
12551	T (°C)											
	pH		8.0	7.9			7.8			7.8	7.7	
	DO (mg/L)		8.1	7.8			8.2			8.4	7.5	
	Conductivity H+H/Amm	X	X	290	X	X	X	X	X	~~X JM~~	270	
12552	T (°C)											
	pH		8.0	7.9			7.8			7.8	7.7	
	DO (mg/L)		8.2	7.9			8.2			8.3	7.4	
	Conductivity H+H/Amm.	X	X	288	X	X	X	X	X	X	270	
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		
	Init./Date (1999):	11/21 JM	11/22	11/23	11/24	11/25 JM	11/26	11/27	11/28 JM	~~11/29~~	11/30 JM	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21~~, 28, ~~35, and end of test~~.

12/22/99

Review: ____ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3622
	Test Start: October 20, 1999	Day 28: November 17, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12589	A	0	JG	—	—	0	-	-	-
	B 2 dead	3	RB	0	RB 11/18	3	-	-	-
Petroleum hydrocarbon odor.	C	2	RB	0	J 11/22	2	-	-	-
	D 1 dead	0	TM	0	RB 11/17	0	-	-	-
	E	0	JG	0	RB 11/17	0	-	-	-
	F	2	JG	—	—	~~2~~	-	-	-
	G 1 dead	0	JG	0	J 11/23	0	-	-	-
	H	0	TM	0	RB 11/18	0	-	-	-
	I	0	PWD	—	—	0	~~0~~	~~26.71~~	
	J	7	PWD	—	—	7	7	28.56	30.22
	K	5	PWD	—	—	5	5	29.67	32.31
	L	8	PWD	—	—	8	8	27.38	29.35
12590	A	3	RB	0	RB	3	-	-	-
	B	0	TM	0	RB	0	-	-	-
	C	2	JG	0	J 11/23	J ~~0~~ 2	-	-	-
	D	0	JG	0	RB	0	-	-	-
Petroleum odor	E	0	TM	—	—	0	-	-	-
	F	10	TM	—	—	10	-	-	-
	G	3	JG	0	RB 11/18	3	-	-	-
	H * J	4	J	—	—	4	-	-	-
	I	1	PWD	—	—	1	1	25.20	26.50
	J	1	PWD	—	—	1	1	23.74	24.61
	K	18	TM	—	—	18	18	25.19	30.72
	L	0	PWD	—	—	0	0	~~27.75~~	
12591	A						-	-	-
	B						-	-	-
	C						-	-	-
	D						-	-	-
	E						-	-	-
	F						-	-	-
	G						-	-	-
	H						-	-	-
	I								
	J								
	K								
	L								

Balance QC: Initial (20 mg = 19.98 JG) Final (20 mg =) Balance Asset #:

Date/time In 11/28 17:00 Temp(°C) 80 Init. JG Date/time out 11/29 16:50 Temp(°C) 81 Init. TM

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

~~* this rep was broken down ...~~ J

Reviewer: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000102

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3622
	Test Start: October 20, 1999	Day 28: November 17, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12592	A	10	RB	—	—	10	-	-	-
	B 1 dead	5	JG	0	RB 11/17	5	-	-	-
	C	1	TM	0	RB 11/17	1	-	-	-
	D	5	TM	0	TM 11/17	5	-	-	-
	E 1 dead	2	RB	0	TM 11/17	2	-	-	-
	F	2	TM	0	RB 11/17	2	-	-	-
	G	2	RB	0	TM 11/17	2	-	-	-
	H	9	JG	—	—	9	-	-	-
	I	0	RW			0	0	~~26.19~~ 0	—
	J	10	RB	—	—	10	10	24.69	30.06
	K	7	RB	0	JG 11/27	7	7	29.48	31.77
	L	6	JG	—	—	6	6	24.01	26.12
12593	A	9	RB	—	—	9	-	-	-
	B	9	RB	—	—	9	-	-	-
	C	8	RB	—	—	8	-	-	-
	D	10	JG	—	—	10	-	-	-
	E	8	TM	0	11/17 TM	8	-	-	-
	F	9	TM	—	—	9	-	-	-
	G	10	JG	—	—	10	-	-	-
	H	9	JG	—	—	9	-	-	-
	I	9	TM	—	—	9	9	23.03	27.51
	J	7	J	no s.e.e. [illegible]		7	7	24.93	28.08
	K	9	J	—	—	9	9	24.19	28.64
(1)	L	4	JG	—	—	4	4	22.67	25.77
12609	A	8	JG	—	—	8	-	-	-
	B	8	JG	—	—	8	-	-	-
	C	6	J	1 [illegible]	J 11/17	7	-	-	-
	D	7	TM	0	J 11/23	7	-	-	-
	E	7	RB	0	J 11/23	7	-	-	-
	F	5	JG	—	—	5	-	-	-
	G	7	TM	0	RB	7	-	-	-
	H	10	J	—	—	10	-	-	-
	I	8	J	—	—	8	8	26.18	31.17
	J	6	RB	0	JG 11/22	6	6	25.92	29.82
	K	10	TM	—	—	10	10	25.86	33.79
	L	3	RB	0	JG 11/27	3	3	26.83	28.89

Balance CC: Initial (20 mg = 20.0 [illegible]) Final (20 mg = 20.0 [illegible]) Balance Asset #:

Date/time In Temp(°C) Init Date/time out 11/29 [illegible] Temp(°C) [illegible] Init. TM

Comments. Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

(1) 12593 L - was broken down on 11/4/99 to assess whether acute mortality had occurred. Exclude from data analysis J 12/22/99

Reviewer J Date 12/22/99

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Laboratory Aquatec Biological Sciences South Burlington Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3622
	Test Start: October 20, 1999	Day 28: November 17, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12610	A	9	TM	—	—	9	-	-	-
	B	10	RB	—	—	10	-	-	-
	C	9	JG	—	—	9	-	-	-
	D	10	RB	—	—	10	-	-	-
	E	20	TM	—	—	20	-	-	-
	F	10	RB	—	—	10	-	-	-
	G	10	TM	—	—	10	-	-	-
	H	10	JG	—	—	10	-	-	-
	I	10	TM	—	—	10	10	25.37	30.21
	J	9	JG	—	—	9	9	23.79	29.45
	K	10	J	—	—	10	10	23.93	30.85
	L	10	RB	—	—	10	10	24.71	31.14
12615	A	9	TM	—	—	9	-	-	-
	B	5	TM	0 11/17	TM	5	-	-	-
	C	2	TM	0	RB 11/17	2	-	-	-
	D	9	JG	—	—	9	-	-	-
	E	3	RB	0	TM 11/17	3	-	-	-
	F	6	TM	0	RB 11/17	6	-	-	-
	G	5	JG	0	RB 11/17	5	-	-	-
	H	6	RB	0	TM 11/17	6	-	-	-
	I	9	J	—	—	9	9	26.73	29.59
	J	8	J	0	JG 11/27	8	8	26.74	28.53
	K	5	J	0	JG 11/27	5	5	23.67	25.29
	L	6	TM	1 0	JG 11/27	7	6 JG	25.89	27.79
	A						-	-	-
	B						-	-	-
	C						-	-	-
	D						-	-	-
	E						-	-	-
	F						-	-	-
	G						-	-	-
	H						-	-	-
	I								
	J								
	K								
	L								

Balance QC: Initial (20 mg = 20.00) Final (20 mg = 2000) Balance Asset #:

Date/time In Temp(°C) Init. Date/time out 11/29 16:50 Temp(°C) 81 Init. TM

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

Reviewer: J Date: 12/22/99

haday28.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000101

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3622
	Test Start: 10/20/99	Test End: 12/01/99

		Day 35 (11/24/99)		Day 42 (12/01/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	Int Wt ~~# Weighed~~	# ~~Init Pan Wt.~~	Total Dry Wt.
12589	A	—	—					24.597		
	B	2	0	2	2	0	0	~~24.55~~[illegible]	2	25.012
	C	2	0	2	2	0	0	27.303	2	27.769
	D	—	—					2		
	E	—	—							
	F	2	0	2	2	0	0	22.285	2	~~28.299~~ 48
	G	—	—							22.753
	H	—	—							
12590	A	3	0	3	1	2	0	24.917	3	25.891
	B	—	—							
	C	2	0	2	0	2	0	27.51	2	28.145
	D	—	—							
	E	—	—							
	F	9	0	9	5	4	3	28.795	9	31.721
	G	3	0	3	1	2	0	23.97	3	25.017
	H	4	0	4	1	3	0	27.219	4	28.188
12591	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									
12592	A	10	0	10	7	3	0	25.08	10	28.091
	B	4	0	4	3	1	0	25.94	4	26.839
	C	1	0	1	1	0	0	26.66	1	26.968
	D	4	0	4	3	1	0	27.25	4	28.124
	E	2	0	2	2	0	0	28.52	2	28.904
	F	2	0	2	2	0	0	29.70	2	30.127
	G	2	0	1	1	0	0	26.35	1	26.479
	H	7	0	7	5	2	0	25.90	7	27.900

Day 35 Initials / Date: 11/24 JM | Day 42 Initials / Date: 12/1/99 JM

Balance QC: Initial (20 mg =) Final (20 mg =) Balance Asset #:

Date/time In 12/1 ... Temp(°C) 70 Init. JM Date/time out 12/2 16:30 Temp(°C) 79 Init. JM

Reviewer [signature] Date 12/22/99

~~only 1 found~~

had3542.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3622
	Test Start: 10/20/99	Test End: 12/01/99

		Day 35 (11/24/99)		Day 42 (12/01/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12593	A	9	0	9	5	4	2	28.406	9	31.993
	B	9	0	8	2	6	0	28.442	8	30.687
	C	8	0	7	3	4	0	23.256	7	25.793
	D	9	4	9	5	4	7	22.864	9	26.279
	E	~~6~~ 8	7	8	5	3	(1) ~~8~~ 11	28.819	8	31.840
	F	9	9	9	5	4	10	25.773	9	28.790
	G	10	0	10	6	4	9	25.808	10	29.535
	H	9	0	8	2	6	23 correction	27.034	8	29.262
12609	A	8	6	8	5	3	28	27.291	8	30.681
	B	8	14	8	5	3	51	27.465	8	31.886
	C	7	2	6	3	3	17	25.256	6	29.073
	D	5	48	5	3	2	0	24.709	5	29.296
	E	5	9	4	1	3	4	25.023	4	27.145
	F	4	0	2	2	0	0	22.014	2	23.770
	G	7	15	6	4	2	9	24.857	6	28.860
	H	6	29	6	5	1	46	24.742	6	28.765
12610	A	9	11	9	5	4	4	30.045	9	34.648
	B	~~8~~ 9	0	9	3	6	3	25.895	9	30.289
	C	9	19	9	5	4	6	25.967	9	30.291
	D	10	9	9	4	5	8	24.932	9	29.076
	E	19	4	16	10	6	8	25.755	16	29.820
	F	9	11	8	5	3	42	26.191	8	29.600
	G	10	7	10	4	6	0	27.894	10	32.831
	H	10	6	10	3	7	13	26.597	10	30.374
12615	A	2	0	2	2	0	0	30.496	2	31.249
	B	3	0	3	2	1	4	25.658	3	26.858
	C	1	0	1	0	1	0	26.744	1	27.018
	D	5	9	5	4	1	2	27.474	5	28.597
	E	2	0	2	2	0	0	26.581	2	27.028
	F	6	7	6	3	3	0	26.590	6	28.155
	G	5	0	3	2	1	0	25.447	3	26.276
	H	5	12	4	3	1	10	27.471	4	28.850

Day 35 Initials / Date: 11/24 TM /

Day 42 Initials / Date: 12/1/99 TM

Balance QC: Initial (20 mg =) Final (20 mg =) Balance Asset #:

Date/time In 12/1 16:30 Temp(°C) 79 Init. TM Date/time out 12/2 16:30 Temp(°C) 79 Init. TM

Reviewer: ______ Date: 12/22/99

(1) Three additional neonates found in rinse. 12/1/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000196

Hyalella azteca Chronic	Menzie Cura	BTRs 3622/3629
Initial Weight Results	Dead Creek	Aquatec Biological Sciences
10/20/99	99033	

Initial Dry Weight Data

Replicate	# Weighed	Initial Boat Weight (mg)	Final Dry Weight (mg)	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
1	10	33.82	34.48	0.066	
2	10	37.73	38.35	0.062	
3	10	42.53	43.23	0.070	
4	10	40.06	40.54	0.048	
5	10	43.76	44.43	0.067	
6	10	40.22	40.73	0.051	
7	10	30.44	30.89	0.045	
8	10	38.71	39.37	0.066	0.059

Hyalella azteca Initial Dry Wt.

Project:	3rd Set Chronic 10/20/99	
Culture ID:	H.a. group 10/13/99	Age: 7d

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)
1	10	33.819	34.48
2	10	37.732	38.35
3	10	42.527	43.263 JG
4	10	40.063	40.54
5	10	43.758	44.43
6	10	40.222	40.73
7	10	30.439	30.89
8	10	38.704	39.37
Initials:			
Date:			

Balance QC: Initial (20 mg = 19.96)		Final (20 mg = 19.96)		Balance Asset #:
Date/time In 12/4 10:50	Temp(°C) 82°C	Init. JS	Date/time out 12/5 12:00	Temp(°C) 80 Init. JG
Comments:				

Reviewer: [signature] Date: 12/22/99

haintwt.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Organism Holding and Acclimation

Species: *Hyalella azteca*	Date Received: 10/15/99 # Rec. 1000
Supplier: ARO	Hatch Date: 10/13/99
Apparent Conditon: Excellent	Culture ID: 10/13

Acclimation / Holding Procedures: Transfer to holding culture boxes, add laboratory water. Acclimate to water to be used for testing (sediment overlying water formulation). Aerate lightly. Water change once (50%) weekly.
Daily Feeding: 1:1 mix of *Selenastrum* / YCT, 1-3 mL (maintain hint of green algal coloration on culture box bottom). Also, pinch of ground Tetrafin/Ceraphyll. Do not allow excess food/fungus to accumulate.
Monitoring: Examine over a light box daily, record apparent condition. Temperature daily; pH, D.O. on Mon., Weds., Fri., (miniumum). Conductivity weekly.
Test starts: record date, time, initials for sediment test and SRT test starts.

1999 Date	Fed	Temp	pH	D.O.	Cond uct.			Water Chg.	Age (Days)	Init.
10/15	YCT Sel TC	16.0						Added 1:1	2	JG
10/16	YCT Sel	22.9							3	JG
10/17	YCT Sel	22.4	7.8	7.7	900				4	JG
10/18	Tetrafin	22.6						Added	5	[illegible]
10/19	YCT Sel	22.7							6	JM
10/20	—	23.5	7.7	6.9	800				7	JG
10/21		24.0	7.7	7.0	800				8	JM

* N = normal, appear healthy. Record # dead if any observed.

Sediment test start (Date/time/Init.) 10/20/99 SRT test start: (Date/time/init.) /

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared ______ Field collected ______

Hatch date 10/13/99 Receipt date ______

Lot number 101399HA Strain ARO

Brood Origination USFWS MO

II. Water Quality

Temperature 24 °C Salinity — ppt DO 7.6

pH 7.4 Hardness ≈180 ppm

III. Culture Conditions

System: FW Static renewal

Diet: Flake Food ✓ Phytoplankton ______ Trout Chow ✓

Brine Shrimp ______ Rotifers ______ Other ______

Prophylactic Treatments: ______

Comments: < 24 HRS OLD AT COLLECTION

IV. Shipping Information

Client: AQUATECH BIOLOGICAL # of Organisms: 1000+

Carrier: FED EX Date Shipped: 10/14/99

Rec'd. 10/15 JG
10:15
Biologist: Stan Sintchi

16.0°C JG
pH = ~~7.4~~ 7.1
DO = 7.20
Cond = 1350

10/16 JG
Temp = 22.9°C
FED

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

Added Sed. Rec. H_2O

FED YCT/Sel/TC

10/17 JG
T = 22.4°C
pH = 7.8
DO = 7.7
Cond. = 900

000110

FED

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Start 10/20/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10	11 JG 10/31
12589	T (°C)	22.9	23.0	22.5/22.7	22.7/22.9	22.6/22.4	23.2/[illegible]	23.1/22.7	22.9/22.5	22.7/23.2	22.7/22.5	22.3/22.7	22.9/22.7
	pH	7.8	—	7.7	—	—	7.8	—	7.7		7.8	—	
	DO (mg/L)	6.8	5.9	5.8	—	—	6.7	—	6.1		6.1	—	
	Conductivity	400✓	X	X	X	X	X	X	320	X	X	X	
	Ammonia + A+H												
12590	T (°C)	22.9	22.1						22.8/22.3	22.7/22.7	23.1/23.6	23.1/23.4	
	pH	7.8	—	7.8	—	—	7.8		7.7		7.8	—	
	DO (mg/L)	6.8	6.3	6.2	—	—	6.5		6.1		5.9	—	
	Conductivity	400✓	X	X	X	X	X	X	320	X	X	X	
	Ammonia + A+H												
12591	T (°C)	23.2	22.6								22.8/22.7	22.6/22.7	
	pH	7.7	—	7.7	—	—	7.7		7.6		7.7	—	
	DO (mg/L)	7.6	7.2	7.4	—	—	7.4		7.2		7.2	—	
	Conductivity	380✓	X	X	X	X	X	X	310	X	X	X	
	Ammonia + A+H												
12592	T (°C)	23.2	22.4								22.8/22.7	22.7/22.6	
	pH	7.8	—	7.8	—	—	7.8		7.8		7.8	—	
	DO (mg/L)	6.8	6.2	6.3	—	—	6.6		6.9		6.2	—	
	Conductivity	380✓	X	X	X	X	X	X	315	X	X	X	
	Ammonia + A+H												
	Init./Date (1999):	10/20 JM	10/21 JG	10/22 JM	10/23 JG	10/24 JG	10/25	10/26 JM	10/27 JM	10/28 JM	10/29 JG	10/30 JG	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of test~~. 28 JG

Review: JG Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000111

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Start 10/20/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12593	T (°C)	22.9	22.6								22.9 / 22.7	22.8 / 22.9
	pH	7.7	—	7.8	—	—	7.8		7.8		7.8	—
	DO (mg/L)	5.5	5.3	6.4	—	—	6.4		6.2		6.0	—
	Conductivity Ammonia + A+H	400 ✓	X	X	X	X	X	X	330	X	X	X
12609	T (°C)	22.9	22.1								21.8 / 21.8	22.0 / 22.2
	pH	7.5	—	7.6	—	—	7.6		7.5		7.6	—
	DO (mg/L)	4.6	4.5	5.1	—	—	5.7		5.3		5.7	—
	Conductivity Ammonia + A+H	420 ✓	X	X	X	X	X	X	330	X	X	X
12610	T (°C)	23.0	22.5								22.7 / 22.6	22.7 / 22.7
	pH	7.8	—	7.8	—	—	7.8		7.7		7.8	—
	DO (mg/L)	6.9	6.0	6.0	—	—	6.6		6.2		6.2	—
	Conductivity Ammonia + A+H	509 ✓	X	X	X	X	X	X	325	X	X	X
12615	T (°C)	23.1	22.7								22.9 / 22.9	22.9 / 23.4
	pH	7.4	—	7.7	—	—	7.8		7.7		7.8	—
	DO (mg/L)	8.2	7.5	7.5	—	—	7.4		7.4		6.8	—
	Conductivity Ammonia + A+H	500 ✓	X	X	X	X	X	X	320	X	X	X
	Init./Date (1999):	10/20 JM	10/21 JG	10/22 JM	10/23 JG	~~10/24~~ JG	10/25	10/26 JM	10/27 TM	10/28 TM	10/29	10/30

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of~~ test.
28 J

Review: J Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000112

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/~~19~~ 20/99

Sample	Parameter	Day of Analysis 11	12	13	14	15	16	17	18	19	20	21
12589	T (ºC)	22.9 / 22.7	23.5 / 23.4	22.9 / 22.8	23.1 / 22.3	22.8 / 22.5	22.3 / 22.3	22.3 / 22.3	21.9 / 22.0	22.3 / 22.7	22.1 / 22.7	23.1 / 22.7
	pH		7.8		7.8		7.7			7.7	7.7	7.7
	DO (mg/L)		7.1		6.6		6.7			6.9	6.4	6.4
	Conductivity A+H	X	X	X	320 ✓	X	X	X	X	X	315 ✓	X
12590	T (ºC)		7.8	22.6 / 22.7							22.7 / 22.3	22.7 / 22.7
	pH		7.0		7.8		7.8			7.7	7.7	7.7
	DO (mg/L)				6.9		6.8			7.0	6.4	6.0
	Conductivity A+H	X	X	X	320 ✓	X	X	X	X	X	320 ✓	X
12591	T (ºC)											
	pH		7.7		7.6							
	DO (mg/L)		7.8		7.1							
	Conductivity A+H	X	X	X	310 ✓	X	X	X	X	X	~~JM~~	X
		Replicates for this sample terminated on 11/1/99 – No survivors.										
12592	T (ºC)											
	pH		7.8		7.8		7.8			7.8	7.8	7.8
	DO (mg/L)		7.6		6.7		7.1			7.2	6.8	6.5
	Conductivity A+H	X	X	X	320 ✓	X	X	X	X	X	320 ✓	X
	Init./Date (1999):	10/31 JG	11/1 JG	11/2 JM	11/3 JG	11/4	11/5	11/6	11/7 JM	11/8 JG	11/9 JM	11/10 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of test~~ 28.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000113

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

Sample	Parameter	Day of Analysis 11	12	13	14	15	16	17	18	19	20	21
12593	T (°C)	~~7.9~~ 1G	7.9									
	pH	~~7.1~~ 1G	7.1		7.8		7.9			7.9	7.9	7.8
	DO (mg/L)				6.8		6.9			7.0	6.5	6.1
	Conductivity	X	X	X	330 ✓	X	X	X	X	X	340 ✓	X
12609	T (°C)											
	pH		7.6		7.5		7.6			7.6	7.4	7.4
	DO (mg/L)		6.5		5.7		6.8			6.5	5.2	4.6
	Conductivity	X	X	X	330 ✓	X	X	X	X	X	330 ✓	X
12610	T (°C)											
	pH		7.7		7.8		7.7			7.7	7.7	7.7
	DO (mg/L)		6.7		6.6		6.8			6.5	6.4	5.8
	Conductivity	X	X	X	320 ✓	X	X	X	X	X	330 ✓	X
12615	T (°C)											
	pH		7.8		7.8		7.8			7.8	7.8	7.8
	DO (mg/L)		7.7		7.5		7.6			7.7	7.4	7.2
	Conductivity	X	X	X	310 ✓	X	X	X	X	X	325 ✓	X
	Init./Date (1999):	10/31 JG	11/1 JG	11/2 ym	11/3 JG	11/4 G	11/5 G	11/6	11/7 ym	~~11/8~~ JG	11/9 ym	11/10 ym

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, ~~20, 40, and end of test~~. 28 J

Review: J Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Start 10/20/99

Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
		Day of Analysis										
12589	T (°C)		22.3/22.5	22.5/22.7	23.0/22.7	22.8/22.4	23.3/22.3	22.2/22.0	23.0/22.9	22.7/23.0	22.5/22.9	23.1/23.3
	pH		7.8			7.9		7.9		8.0		
	DO (mg/L)		7.2			7.5		7.5		8.3		
	Conductivity	X	X	X	X	X	X	300	X	X		X
12590	T (°C)				22.5/22.7							
	pH		7.8			7.9		7.9		8.0		
	DO (mg/L)		7.3			7.3		7.4		8.1		
	Conductivity	X	X	X	X	X	X	300	X	X	X	X
12591	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
12592	T (°C)											
	pH		7.9			7.9		7.9		7.9		
	DO (mg/L)		7.4			7.4		7.4		8.0		
	Conductivity	X	X	X	X	X	X	310	X	X	X	X
	Init./Date (1999):	11/11 JM	11/12 JG	11/13 JG	11/14 JM	11/15 JG	11/16	11/17	11/18	11/19	11/20	11/21 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21~~, 28, ~~35, and end of test~~.

Review: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000115

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Start 10/20/99

		Day of Analysis										
Sample	**Parameter**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
12593	T (°C)	22.1/22.1										
	pH		7.9			7.9		7.9		7.9		
	DO (mg/L)		7.5			7.7		7.6		7.9		
	Conductivity	X	X	X	X	X	X	300 ✓	X	X		X
12609	T (°C)	22.1/22.7										
	pH		7.6			7.6		7.6		7.9		
	DO (mg/L)		6.6			6.3		6.4		8.0		
	Conductivity	X	X	X	X	X	X	310 ✓	X	X	X	X
12610	T (°C)											
	pH		7.8			7.7		7.7		7.9		
	DO (mg/L)		7.2			7.0		6.9		8.0		
	Conductivity	X	X	X	X	X	X	300 ✓	X	X	X	X
12615	T (°C)											
	pH		7.9			7.9		7.9		8.0		
	DO (mg/L)		7.9			7.7		7.7		8.0		
	Conductivity	X	X	X	X	X	X	310 ✓	X	X	X	X
	Init./Date (1999):	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21,~~ 28, 3~~5, and end of te~~st.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000116

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Start 10/20/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	
		Day of Analysis										
12589	T (°C)	23.7/23.5	23.4/22.2	23.3/23.9	22.8/23.4	23.4/23.2	22.9/22.9	22.9/22.9	22.9/23.0	22.7/22.7	22.9/23.1	
	pH	8.0		8.0		7.8			7.9		7.7	
	DO (mg/L)	8.3	8	8.3		8.2			8.4	~~7.4~~ JM	7.9	
	Conductivity	X	X	270	X	X	X	X	X	X	270	
12590	T (°C)											
	pH	8.0		7.9		7.8			7.9		7.7	
	DO (mg/L)	8.4		8.2		8.2			8.3	~~7.~~ JM	~~5.~~ JM 7.5	
	Conductivity	X	X	290	X	X	X	X	X	X	280	
12591	T (°C)											
	pH	~~8.0~~ JG										
	DO (mg/L)	~~8.4~~ JG		~~8.2~~					~~8.3~~ JG			
	Conductivity	X	X	~~290~~	X	X	X	X	X	X		
12592	T (°C)											
	pH	8.0		7.9		7.8			7.9		7.6	
	DO (mg/L)	8.3 JG		7.9		8.1			8.3		7.0	
	Conductivity	X	X	280	X	X	X	X	X	X	280	
	Init./Date (1999):	11/22 JG	11/23	11/24	11/25 JM	11/26	11/27 JG	11/28 JM	11/29 JG	11/30 JM	12/1 JM	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21,~~ 28, ~~35, and end of test~~.

Review: J Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000117

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 Test Start 10/20/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	
		Day of Analysis										
12593	T (°C)											
	pH	8.0		7.8		7.8			7.9		7.7	
	DO (mg/L)	8.3		8.3		8.2			8.3		7.4	
	Conductivity	X	X	280	X	X	X	X	X	X	280	
12609	T (°C)											
	pH	8.0		7.9		7.8			7.9		7.7	
	DO (mg/L)	8.2		8.3		8.2			8.3		7.2	
	Conductivity	X	X	280	X	X	X	X	X	X	290	
12610	T (°C)											
	pH	8.0		7.9		7.7			7.8		7.7	
	DO (mg/L)	8.3		8.2		8.1			8.3		7.5	
	Conductivity	X	X	280	X	X	X	X	X	X	280	
12615	T (°C)											
	pH	8.0		7.9		7.8			7.8		7.7	
	DO (mg/L)	8.4		8.2		8.2			8.2		7.5	
	Conductivity	X	X	280	X	X	X	X	X	X	280	
	Init./Date (1999):	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21~~, 28, 35, ~~and end of test~~.

12/22/99

Review: ________ Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000118

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3629 / 3633
	Test Start: October 21, 1999	Day 28: November 18, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12611	A	6	TM	1 (2)	J 11/23	7	- -	-	-
	B	8	LS	0	J 11/18	8	-	-	-
	C	2	RB	0	J 11/23	2	-	-	-
	D	8	PoD	—	—	8	-	-	-
	E	9	J	—	—	9	-	-	-
	F	0	J	—	—	0	-	-	-
	G	4	J	0	J	4	-	-	-
	H	10 ~~X~~ (1)	J	0	J 11/18	(1) ~~X~~ 10	-	-	-
	I	6	RB	~~0~~	JG 11/27	6	4	22.67	25.83
	J	~~X~~ 9	~~[illegible]~~ RB	—	—	9	9	22.17	25.52
	K	8	TM	—	—	8	8	22.23	25.87
	L	9	PoD	—	—	9	9	22.99	28.91
12612	A	9	RB	—	—	9	-	-	-
	B	9	J	—	—	9	-	-	-
	C	10	J	—	—	10	-	-	-
	D	7	RB	—	—	7	-	-	-
	E	10	LS	—	—	10	-	-	-
	F	8	RB	—	—	8	-	-	-
	G	10	LS	—	—	10	-	-	-
	H	10	RB	—	—	10	-	-	-
	I	9	J	—	—	9	9	25.91	31.56
	J	10	LS	—	—	10	10	24.29	29.39
	K	10	RB	—	—	10	10	24.46	31.13
	L	10	RB	—	—	10	10	22.78	28.57
12613	A	10	RB	—	—	10	-	-	-
	B	10	LS	—	—	10	-	-	-
	C	(1) 9 ~~8~~	J	0	J	(1) ~~8~~ 9	-	-	-
	D	9	LS	—	—	9	-	-	-
	E	9		—	—	9	-	-	-
	F	8	PoD	—	—	8	-	-	-
	G	8	TM	—	—	8	-	-	-
	H	8	LS	0	J 11/18	8	-	-	-
	I	9	RB	—	—	9	9	22.01	27.24
	J	9	LS	—	—	9	9	22.76	30.78
	K	10	LS	—	—	10	10	22.46	27.06
	L	8	PoD	—	—	8	8	25.19	30.08

Repick completed 11/23/99 J

Balance CC: Initial (20 mg = 20.00) Final (20 mg = 20.00) Balance Asset #:

Date/time In 11/18 Temp(°C) 23 Init. TM Date/time out 11/30 18:00 Temp(°C) 23 Init. JG

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

(1) Correction, wrote value in wrong location. JW

(2) those found at repick not included in reproductive assessment (they were preserved)

Reviewer [signature] Date 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000119 J

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3629 / 3633
	Test Start: October 21, 1999	Day 28: November 18, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12614	A	10	LS	—	—	10	-	-	-
	B	9	J	—	—	9	-	-	-
	C	9	RB	—	—	9	-	-	-
	D	9	LS	—	—	9	-	-	-
	E	10	LS	—	—	10	-	-	-
	F	9	RB	—	—	9	-	-	-
	G	10	J	—	—	10	-	-	-
	H	10	J	—	—	10	-	-	-
	I	10	RB	—	—	10	10	21.38	26.76
	J	10	J	—	—	10	10	22.60	26.02
	K	8	RB	—	—	8	8	23.07	27.05
	L	10	LS	—	—	10	10	24.53	29.57
12622	A	2	LS	0	J 11/23	2	-	-	-
	B	2	TM	0		2	-	-	-
	C	9	J	0		9	-	-	-
	D	8	J	0		8	-	-	-
	E	2	TM	0		2	-	-	-
	F	~~5~~ ~~7~~	J TM	1(2) / 0	J 11/18 J 11/23	8	-	-	-
	G	(1) ~~5~~ ~~8~~ 7	~~J~~ ~~TM~~	0	J 11/23	5	-	-	-
	H	7	TM	0		7	-	-	-
	I	1	J	—		1	1	24.40	24.76
	J	9	LS	0		9	9	24.02	28.06
	K	7	LS	0		7	6	23.44	27.07
	L	6	J	0		6	6	23.17	26.70
12638	A	4	LS	0	J 11/23	4	-	-	-
	B	7	J	—	—	7	-	-	-
	C	10	LS	—	—	10	-	-	-
	D	9	LS	—	—	9	-	-	-
	E	9	LS	—	—	9	-	-	-
	F	8	LS	—	—	8	-	-	-
	G	9	LS	—	—	9	-	-	-
	H	6	J	1 dead J	J	6	-	-	-
	I	10	AW	—	—	10	10	20.52	24.73
	J	10	J	—	—	10	10	21.56	26.96
	K	8	LS	0	J 11/18	8	8	22.80	27.70
	L	8	PCD	—	—	8	8	23.32	28.59

Balance QC: Initial (20 mg = 20.00) Final (20 mg = 20.00) Balance Asset #:

Date/time In 11/29 18:30 Temp(°C) 81 Init. TM Date/time out Temp(°C) Init.

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

(1) wrote in wrong location J 11/18/99

(2) Died during sieving J 11/18/99 Only 7 continued for reproduction assessment

Reviewer: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000130

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3629 / 3633
	Test Start: October 21, 1999	Day 28: November 18, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12639	A	10	J	—	—	10	-	-	-
	B	8	LS	0	J 11/23	8	-	-	-
	C	9	LS	—	—	9	-	-	-
	D	~~8~~ 9 LS	~~LS~~ LS	—	—	~~8~~ 9 LS	-	-	-
	E	9	J	—	—	9	-	-	-
	F	10	RB	—	—	10	-	-	-
	G	8	~~PCD~~	—	—	8	-	-	-
	H	10	PCD	—	—	10	-	-	-
	I	8	LS	0	J 11/18	8	8	21.79	26.42
	J	9	J	—	—	9	9	23.94	30.98
	K	10	PCD	—	—	10	10	26.61	32.88
	L	10	LS	—	—	10	10	24.90	30.59
12640	A	4	LS	0	J 11/18	8	-	-	-
	B	9	J	—	—	9	-	-	-
	C	8	TM	1 ①	J 11/23	9	-	-	-
	D	9	J/RB	—	—	9	-	-	-
	E	9	RB	—	—	9	-	-	-
	F	9	RB	—	—	9	-	-	-
	G	8	J	—	—	8	-	-	-
	H	10	RB	—	—	10	-	-	-
	I	10	PCD	—	—	10	10	24.65	30.61
	J	10	RB	—	—	10	10	24.67	29.04
[illegible]	K	7	PCD	—	—	7	7	22.24	26.68
	L	10	J	—	—	10	10	25.07	30.55
12641	A	9	J	—	—	9	-	-	-
	B	10	RB	—	—	10	-	-	-
	C	10	LS	—	—	10	-	-	-
	D	10	J	—	—	10	-	-	-
	E	9	J	—	—	9	-	-	-
	F	7	LS	0	J 11/23	7	-	-	-
	G	8	RB	—	—	8	-	-	-
	H	8	J	—	—	8	-	-	-
	I	10	RB	—	—	10	10	22.53	28.22
	J	9	LS	—	—	9	9	21.80	26.97
	K	9	TM	—	—	9	9	21.91	27.78
	L	8	J	—	—	8	8	25.18	31.88

Balance CC: Initial (20 mg = [illegible]) Final (20 mg = 20.00) Balance Asset #:

Date/time In 11/24/99 Temp(°C) 21 Init. TM Date/time out Temp(°C) Init.

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

① Amphipods found on repick were preserved, NOT included in reproduction assessment. J

Reviewer [illegible] Date 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000121

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: ~~3622~~ 3629
	Test Start: 10/21/99	Test End: 12/02/99

		Day 35 (11/25/99)		Day 42 (12/02/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12611	A	4	0	4	3	1	2	4	27.332	29.05
	B	~~8~~ 8	8	8	6	2	43	8	25.013	28.43
	C	2	1	1	0	1	0	1	25.533	26.11
	D	7	0	6	3	3	8	6	26.306	28.31
	E	9	5	9	7	2	21	9	25.097	28.25
	F	—	—					0	~~25.778~~	~~28.60~~ TG recorded in wrong space. 12/3
	G	4	1	4	2	2	4	4	26.682	28.60
	H	8	7	8	4	4	23	8	24.587	27.42
12612	A	8	6	8	3	5	8	8	24.605	27.68
	B	8	3	7	4	3	17	7	24.799	27.58
	C	10	9	~~6~~ 8	~~2~~ 3	~~4~~ 5	13	8	26.645	28.97
	D	10	2	6	2	4	2	6	24.786	28.03
	E	10	11	10	4	6	7	10	26.571	30.43
	F	8	7	8	4	4	6	8	26.143	28.98
	G	10	5	9	4	5	6	9	27.594	30.71
	H	10	5	10	4	6	7	10	26.377	29.82
12613	A	8	3	6	4	2	13	6	24.816	26.98
	B	10	1	10	4	6	15	10	25.583	29.29
	C	9	0	9	8	1	16	9	26.069	29.16
	D	9	10	9	3	6	12	9	26.563	30.03
	E	~~5~~ 4	5	3	1	2	4	3	24.406	26.37
	F	8	4	8	5	3	16	8	26.978	30.16
	G	8	2	8	3	5	9	8	27.395	30.79
	H	8	6	~~8~~ 7	~~5~~ 3	~~5~~ 4	8	7	26.180	29.33
12614	A	7	3	9	5	4	21	9	26.740	29.96
	B	9	2	9	3	6	8	9	28.546	31.16
	C	7	5	7	3	4	9	7	25.742	28.16
	D	9	4	9	5	4	26	9	25.353	28.97
	E	10	1	7	4	3	38	7	25.749	27.91
	F	9	13	9	5	4	14	8	27.982	30.34
	G	10	1	10	7	3	~~22~~ 27	10	24.246	27.25
	H	8	3	7	2	5	6	7	24.503	26.45

Day 35 Initials / Date: 11/25/99 TJB | Day 42 Initials / Date: 12/2/99 TM TG RB

Balance QC: Initial (20 mg = 19.96) Final (20 mg = 19.99) Balance Asset #: 1

Date/time In 12/2 18:00 Temp(°C) 78 Init. TM Date/time out 12/3 18:00 Temp(°C) 80 Init. TG

Reviewer: TG Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: ~~3622~~ 3629
	Test Start: 10/21/99	Test End: 12/02/99

		Day 35 (11/25/99)		Day 42 (12/02/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12622	A	2	0	1	0	1	0	1	22.130	22.55
	B	2	0	2	1	1	4	2	25.225	25.84
	C	7	8	6	2	4	7	6	24.547	26.47
	D	1 #2 dead	4	1	0	1	0	1	26.165	26.60
	E	1	0	1	0	1	0	1	23.665	24.18
	F	5	4	5	2	3	8	5	26.575	28.14
	G	6	5	6	2	4	6	6	26.665	29.17
	H	6	5	6	3	3	21	6	25.173	27.00
12638	A	4	0	4	1	3	3	4	26.413	28.99
	B	~~16~~ 6	~~5 6~~ 7	7	4	3	18	7	29.865	32.83
	C	10	3	9	5	4	20	8	27.238	30.15
	D	9	16	9	6	3	31	9	29.597	32.43
	E	8	6	8	4	4	12	8	28.008	30.82
	F	6	3	7	4	3	13	7	25.913	28.64
	G	~~5 8~~ 9	2	9	5	4	18	9	23.060	26.03
	H	6	0	5	1	4	0	5	25.482	27.01
12639	A	10	4	10	3	7	14	10	28.596	32.16
	B	8	3	8	3	5	14	8	26.543	29.87
	C	9	0	9	3	6	6	9	22.405	26.12
	D	8	6	7	3	4	13	7	25.659	28.41
	E	9	~~2~~ 24	8	5	3	21	8	23.120	26.62
	F	10	2	9	2	7	5	9	25.003	28.36
	G	7	2	6	2	4	12	6	25.459	~~28~~ 27.99 JG
	H	10	4	10	4	6	9	10	22.961	26.57
12640	A	7 1 dead	1	7	2	5	7	7	29.192	33.16
	B	8	10	8	6	2	25	8	27.439	30.64
	C	10	6	5	4	1	12	6	26.678	29.13
	D	8	8	8	3	5	14	8	26.494	30.50
	E	7 1 dead	10	7	5	2	23	7	22.197	25.41
	F	~~8 6~~ 7	~~5 3~~ 0	6	3	3	2	6	21.576	24.78
	G	8	4	8	5	3	9	8	24.356	27.25
	H	8	3	~~8~~ 7	~~4~~ 3	4	12	8	27.203	30.48

Day 35 Initials / Date: 11/25/99 | Day 42 Initials / Date: 12/2/99 TM RB

Balance QC. Initial (20 mg =) Final (20 mg =) Balance Asset #:

Date/time In 12/2 8:00 Temp(°C) 78 Init. TM Date/time out 12/3 18:00 Temp(°C) 80 Init. JG

Reviewer JG Date 12/22/99

had3542.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000123

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: ~~3622~~ 3629
	Test Start: 10/21/99	Test End: 12/02/99

		Day 35 (11/25/99)		Day 42 (12/02/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12641	A	9	0	9	3	6	12	9	27.201	30.62
	B	10	~~8~~ ~~8~~ 9	8	6	2	22	8	25.428	28.81
	C	9	0	9	4	5	28	9	26.280	30.51
	D	9	6	7	4	3	19	9	22.539	25.68
	E	9	7	9	5	4	14	9	23.445	26.55
	F	7	3	5	3	2	5	5	24.390	26.64
	G	8	1	~~8~~ ~~6~~ 7	~~3~~ 4	3	27	7	24.521	27.86
	H	7	3	7	4	3	6	7	25.594	28.09
	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									
	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									
	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									

Day 35 Initials / Date: YS 11/25 | Day 42 Initials / Date: 12/2/99 TM RB

Balance QC: Initial (20 mg =) Final (20 mg =) Balance Asset #:

Date/time In 12/2 1800 Temp(°C) 79 Init. TM Date/time out Temp(°C) Init.

Reviewer: C Date: 12/22/99

had3542.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Initial Dry Weight Data					
Replicate	# Weighed	Initial Boat Weight (mg)	Final Dry Weight (mg)	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
1	10	42.89	44.31	0.142	
2	9	42.23	43.57	0.149	
3	10	38.04	39.71	0.167	
4	10	36.93	38.64	0.171	
5	10	39.27	41.06	0.179	
6	10	37.02	38.70	0.168	
7	10	37.00	38.83	0.183	
8	10	39.69	41.36	0.167	0.166

Hyalella azteca Initial Dry Wt.

Project: 4th set Chronic	
Culture ID: 10/20 Ha. 13/14	Age:

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)
1	10	42.892	44.31
2	~~8~~ ~~10~~ 9	42.227	43.57
3	10	38.041	39.71
4	10	36.926	38.64
5	10	39.273	41.06
6	10	37.017	38.70
7	10	37.003	38.83
8	10	39.685	41.36
Initials:			
Date:			

Balance QC: Initial (20 mg = 19.96)	Final (20 mg = 19.96)	Balance Asset #:	
Date/time In 12/4 10:55 Temp(°C) 82°C Init. SB	Date/time out 12/5 12:00 Temp(°C) 80	Init. JG	
Comments:			

Reviewer: [signature] Date: 12/22/99
haintwt.doc
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Organism Holding and Acclimation

Species: *Hyalella azteca*	Date Received: 10/15/99 # Rec. 1000
Supplier: ARO	Hatch Date: 10/13/99
Apparent Conditon: Excellent	Culture ID: 10/13

Acclimation / Holding Procedures: Transfer to holding culture boxes, add laboratory water. Acclimate to water to be used for testing (sediment overlying water formulation). Aerate lightly. Water change once (50%) weekly.
Daily Feeding: 1:1 mix of *Selenastrum* / YCT, 1-3 mL (maintain hint of green algal coloration on culture box bottom). Also, pinch of ground Tetrafin/Ceraphyll. Do not allow excess food/fungus to accumulate.
Monitoring: Examine over a light box daily, record apparent condition. Temperature daily; pH, D.O. on Mon., Weds., Fri., (miniumum). Conductivity weekly.
Test starts: record date, time, initials for sediment test and SRT test starts.

1999 Date	Fed	Temp	pH	D.O.	Cond uct			Water Chg.	Age (Days)	Init.
10/15	YCT-Sel	16.0						Added 1:1	2	JG
10/16	YCT Sel	22.9							3	JG
10/17	YCT Sel	22.4	7.8	7.7	900				4	JG
10/18	Tetrafin	22.6						Added	5	[illegible]
10/19	YCT Sel	22.7							6	JM
10/20	—	23.5	7.7	6.9	800				7	JG
10/21		24.0	7.7	7.0	800				8	JM

* N = normal, appear healthy. Record # dead if any observed.

Sediment test start (Date/time/Init.) 10/21/99 SRT test start: (Date/time/init.) ——

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared ___ Field collected ___

Hatch date 10/13/99 Receipt date ___

Lot number 101399HA Strain ARO

Brood Origination USFWS MO

II. Water Quality

Temperature 24 °C Salinity — ppt DO 7.6

pH 7.4 Hardness ≈180 ppm

III. Culture Conditions

System: FW STATIC renewal

Diet: Flake Food ✓ Phytoplankton ___ Trout Chow ✓

Brine Shrimp ___ Rotifers ___ Other ___

Prophylactic Treatments: ___

Comments: < 24 HRS OLD AT COLLECTION

IV. Shipping Information

Client: AQUATECH BIOLOGICAL # of Organisms: 1000+

Carrier: FED EX Date Shipped: 10/14/99

Biologist: Stan Sintelli

rec'd. 10/15 JG 10:15
T=16.0°C JG
~~pH~~=7.1
DO=7.20
Cond=1350
Added Sed. Rec. H_2O
FED YCT/Sel/TC

10/16 JG
Temp=22.9°C
FED

10/17 JG
T=22.4°C
pH=7.8
DO=7.7
cond.=900

FED

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

Organism Holding and Acclimation

Species: *Hyalella azteca*	Date Received: 10/15/99 # Rec. 1100
Supplier: ARO	Hatch Date: 10/14/99
Apparent Conditon: Excellent	Culture ID: 10/14

Acclimation / Holding Procedures: Transfer to holding culture boxes, add laboratory water. Acclimate to water to be used for testing (sediment overlying water formulation). Aerate lightly. Water change once (50%) weekly.
Daily Feeding: 1:1 mix of *Selenastrum* / YCT, 1-3 mL (maintain hint of green algal coloration on culture box bottom). Also, pinch of ground Tetrafin/Ceraphyll. Do not allow excess food/fungus to accumulate.
Monitoring: Examine over a light box daily, record apparent condition. Temperature daily; pH, D.O. on Mon., Weds., Fri., (miniumum). Conductivity weekly.
Test starts: record date, time, initials for sediment test and SRT test starts.

1999 Date	Fed	Temp	pH	D.O.	Conduct			Water Chg.	Age (Days)	Init.
10/15	YCT Sel	16.0						Added 1:1	1	JG
10/16	YCT Sel	22.8							2	KJG
10/17	YCT Sel	22.3	7.8	7.6	1,100				3	KJG
10/18	Tetrafin	22.5						Added	4	J
10/19	YCT Sel	23.0							5	TM
10/20									6	
10/21		24.0	7.8	6.9	1100				7	TM
10/22									8	

* N = normal, appear healthy. Record # dead if any observed.

Sediment test start (Date/time/Init.) 10/21/99 SRT test start: (Date/time/init.) 10/23/99

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared_____ Field collected_____

Hatch date 10/14/99 Receipt date_____

Lot number 101499HA Strain ARO

Brood Origination USFWS MO

II. Water Quality

Temperature 24 °C Salinity — ppt DO 7.6

pH 7.4 Hardness ≈180 ppm

III. Culture Conditions

System: FW STATIC renewal

Diet: Flake Food ✓ Phytoplankton_____ Trout Chow ✓

Brine Shrimp_____ Rotifers_____ Other_____

Prophylactic Treatments:_____

Comments: < 24 HRS OLD AT COLLECTION

IV. Shipping Information

Client: AQUATECH BIOLOGICAL # of Organisms: 1100+

Carrier: FED EX Date Shipped: 10/14/99

Biologist: Stan Sintalli

Received 10/15
10:15 JG
Temp = 16.0°C
pH = 7.1
DO = 7.20
Cond = 1350

10/16 JG
Temp = 22.8°C
FED.

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

Added Sed & Recon H2O

10/17 JG
T = 22.3°C
pH = 7.8
DO = 7.6
cond = 1,100

FED YCT/Sel./TC

FED

A00130

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629/33 Test Start 10/21/99

		Day of Analysis										
Sample	**Parameter**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
12611	T (°C)	22.9	22.2/22.7	22.0/22.3	22.0/21.9	22.8/22.0	22.0/22.1	22.4/22.6	22.2/22.1	22.2/22.1	21.9/21.9	22.0/22.4
	pH	7.8	7.9	—	—	7.9		7.8		7.8	—	—
	DO (mg/L)	7.0	7.1	—	—	7.4		7.2		6.2	—	—
	Conductivity	360	X	X	X	X	X	X	290	X	X	X
12612	T (°C)	22.7	22.3/22.7				22.6/22.7	21.9/21.9	22.6/22.3	22.3/22.2	22.2/22.0	
	pH	7.9	8.0	—	—	7.9		7.8		7.9	—	—
	DO (mg/L)	6.9	7.1	—	—	6.8		6.8		6.3	—	—
	Conductivity	360	X	X	X	X	X	X	325	X	X	X
12613	T (°C)	22.7								22.2/22.3	22.2/22.7	
	pH	7.9	7.9	—	—	7.9		7.8		7.9	—	—
	DO (mg/L)	7.1	7.3	—	—	6.7		6.9		5.9	—	—
	Conductivity	350	X	X	X	X	X	X	335	X	X	X
12614	T (°C)	22.7								22.5/22.3	22.1/22.2	
	pH	7.8	7.9	—	—	7.9		7.8		7.9	—	—
	DO (mg/L)	7.1	7.4	—	—	6.6		6.8		6.7	—	—
	Conductivity	350	X	X	X	X	X	X	305	X	X	X
	Init./Date (1999):	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, ~~20, 40, and end of test~~.

Review: ________ Date: 12/22/99

H. azteca added. 10/21/99 JG

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

A00131

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629/33 Test Start 10/21/99

Sample	Parameter	Day 0	1	2	3	4	5	6	7	8	9	10
12622	T (°C)	22.7								22.3 / 22.7	22.5 / 22.2	
	pH	8.0 ~~7.8~~	7.6	—	—	7.8	~~7~~	7.7		7.8	—	—
	DO (mg/L)	8.0 ~~6.7~~	7.9	—	—	7.65		7.6		6.2	—	—
	Conductivity	~~350~~ 400	X	X	X	X	X	X	320	X	X	X
12638	T (°C)	22.7								22.3 / 22.0	22.2 / 22.1	
	pH	7.3	7.9	—	—	7.8		7.9		7.7	—	—
	DO (mg/L)	~~8.0~~ 6.7	7.2	—	—	7.1		6.9		6.9	—	—
	Conductivity	360	X	X	X	X	X	X	310	X	X	X
12639	T (°C)	23.2								22.5 / 22.6	22.6 / 22.7	
	pH	7.8	7.8	—	—	7.9		7.9		8.2	—	—
	DO (mg/L)	6.7	7.1	—	—	7.1		6.6		6.2	—	—
	Conductivity	350	X	X	X	X	X	X	310	X	X	X
12640	T (°C)	23.3								22.1 / 22.1	21.9 / 21.8	
	pH	7.7	8.0	—	—	7.9		7.7		7.6	—	—
	DO (mg/L)	6.6	8.0	—	—	6.6		6.2		6.5	—	—
	Conductivity	350	X	X	X	X	X	X	370	X	X	X
	Init./Date (1999):	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	~~10/31~~

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of~~ 28 test.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000137

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629/33 Test Start 10/21/99

		Day of Analysis										
Sample	**Parameter**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
12641	T (°C)	22.7								~~23.0~~ 22.8	~~22.6~~ 22.3	
	pH	7.6	7.8	—	—	7.7		7.7		7.8	—	—
	DO (mg/L)	6.3	7.4	—	—	5.1		5.9		5.8	—	—
	Conductivity Am/NH	400 ✓	X	X	X	X	X	X	390	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	Init./Date (1999):	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group. 28
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14~~, 20, 40, and end of test~~.

Review: ______ Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

0001133

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3615~~ 3629/33 Test Start 10/~~19~~ 21/99

Sample	Parameter	11	12	13	14	15	16	17	18	19	20	21
		Day of Analysis										
12611	T (°C)	22.4 / 22.1	22.3 / 22.2	22.3 / 22.6	22.0 / 22.4	22.4 / 22.6	21.4 / 21.2	22.2 / 22.5	22.0 / 22.2	22.7 / 22.4	22.0 / 22.5	21.4 / 22.2
	pH	8.3		8.3		8.2			8.4		8.3	
	DO (mg/L)	6.4		6.5		6.2			6.7		6.0	
	Conductivity A+H Ammonia	X	X	X	350	X	X	X	X	X	330	X
12612	T (°C)		22.5 / 22.2					22.7 / 22.8		21.4 / 21.9	22.7 / 22.6	22.5 / 22.1
	pH	8.1		7.9		8.0			8.0		7.9	
	DO (mg/L)	6.8		6.6		6.4			6.5		6.1	
	Conductivity A+H	X	X	X	310	X	X	X	X	X	315	X
12613	T (°C)	8.0										
	pH	6.9		8.0		8.3			8.3		8.4	
	DO (mg/L)			6.6		6.5			6.9		6.5	
	Conductivity A+H	X	X	X	310	X	X	X	X	X	330	X
12614	T (°C)											
	pH	8.0		8.1		8.2			8.7		8.6	
	DO (mg/L)	6.9		6.6		6.5			7.0		6.0	
	Conductivity A+H	X	X	X	310	X	X	X	X	X	330	X
	Init./Date (1999):	11/1 JG	11/2 JM	11/3 JG	11/4	11/5	11/6	11/7 JM	11/8 JG	11/9 TM	11/10 TM	11/11 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of test.~~ 28

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

0001134

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3615~~ 3617/33 Test Start 10/~~19~~ 21/99

Sample	Parameter	Day of Analysis 11	12	13	14	15	16	17	18	19	20	21
12622	T (°C)											
	pH	7.8		7.7		7.8			7.9		7.9	
	DO (mg/L)	7.2		7.0		7.4			7.4		7.3	
	Conductivity	X	X	X	330	X	X	X	X	X	320	X
12638	T (°C)											
	pH	7.9		8.0		8.4			8.3		8.4	
	DO (mg/L)	7.0		6.5		6.3			6.6		5.9	
	Conductivity	X	X	X	290	X	X	X	X	X	330	X
12639	T (°C)											
	pH	8.3		8.3		8.5			8.6		8.2	
	DO (mg/L)	6.8		6.6		6.4			6.8		6.3	
	Conductivity	X	X	X	320	X	X	X	X	X	350	X
12640	T (°C)											
	pH	7.6		7.7		7.7			7.8		7.8	
	DO (mg/L)	6.7		6.9		6.6			6.8		6.6	
	Conductivity	X	X	X	340	X	X	X	X	X	330	X
	Init./Date (1999):	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9	11/10	11/11

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, ~~20, 40, and end of test.~~ 28

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000135

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Start 10/19/99

Sample	Parameter	Day of Analysis 11	12	13	14	15	16	17	18	19	20	21
12641	T (ºC)											
	pH	7.7		7.7		7.7			7.8		7.8	
	DO (mg/L)	6.3		5.9		6.0			6.1		5.3	
	Conductivity	X	X	X	370 ✓	X	X	X	X	X	340 ✓	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	Init./Date (1999):	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9	11/10	11/11

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 20, 40, and end of~~ 28 test.

Review: Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000136

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 33 Test Start 10/21/99

Sample	Parameter	Day of Analysis 22	23	24	25	26	27	28	29	30	31	32
12611	T (°C)	21.8 / 21.9	22.0 / 22.5	21.4 / 22.3	21.8 / 21.9	21.8 / 21.8	22.1 / 22.0	22.1 / 21.5	22.6 / 22.6	22.8 / 22.7	22.9 / 22.9	22.7 / 22.6
	pH	8.1			8.2		8.1	8.1				7.9
	DO (mg/L)	7.2			7.2		6.8	[illegible]				8.3
	Conductivity	X	X	X	X	X	X	330 ✓	X	X	X	X
12612	T (°C)			22.6 / 22.8				22.9 / 23.2				
	pH	8.0			7.9		7.9	7.8				8.0
	DO (mg/L)	7.2			6.5		6.6	~~6.5~~ 6.7				8.4
	Conductivity	X	X	X	X	X	X	310 ✓	X	X	X	X
12613	T (°C)											
	pH	8.3			8.2		8.1	7.9				7.9
	DO (mg/L)	7.4			7.1		6.8	6.9				8.4
	Conductivity	X	X	X	X	X	X	330 ✓	X	X	X	X
12614	T (°C)											
	pH	8.~~0~~7 JG			8.8		8.7	8.4				8.0
	DO (mg/L)	7.~~6~~2 G			6.6		6.5	6.7				8.5
	Conductivity	X	X	X	X	X	X	330 ✓	X	X	X	X
	Init./Date (1999):	11/12 JG	11/13 JG	11/14 JM	11/15 JG	11/16 W	11/17 JG	11/18 W	11/19 WD	11/20 JG	11/21 JM	11/22 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21,~~ 28, 3~~5, and end of te~~st.

Review: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000137

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 33 Test Start 10/21/99

		Day of Analysis										
Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
12622	T (°C)											
	pH	7.8			7.9		8.0	7.8				8.0
	DO (mg/L)	7.9			7.8		7.4	7.6				8.5
	Conductivity	X	X	X	X	X	X	290/✓	X	X		X
12638	T (°C)											
	pH	8.1			8.1		8.0	7.9				8.0
	DO (mg/L)	7.0			7.1		7.1	6.3				8.5
	Conductivity	X	X	X	X	X	X	320	X	X	X	X
12639	T (°C)											
	pH	8.3			8.2		8.2	7.9				8.0
	DO (mg/L)	7.2			7.2		6.8	6.9				8.4
	Conductivity	X	X	X	X	X	X	320 ✓	X	X	X	X
12640	T (°C)											
	pH	7.8			7.9		7.9	7.7				7.9
	DO (mg/L)	7.1			7.1		6.9	6.9				8.4
	Conductivity	X	X	X	X	X	X	290/✓	X	X	X	X
	Init./Date (1999):	11/12 JG	11/13 JG	11/14 JM	~~11/15~~ JG	11/16 GD	11/17 JG	11/18 GD	11/19	11/20	11/21 JM	11/22 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21~~, 28, ~~35, and end of test~~.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000138

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 33 Test Start 10/21/99

		Day of Analysis										
Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
12641	T (°C)											
	pH	7.9			8.1		8.2	7.7				7.9
	DO (mg/L)	6.9			6.6		6.9	6.8				8.2
	Conductivity	X	X	X	X	X	X	310	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	Init./Date (1999):	11/12 KS	11/13	11/14 JM	11/15 JG	11/16	11/17 JG	11/18 ud	11/19	11/20	11/21 JM	11/22 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 2~~1, 28, 3~~5, and end of test~~.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000139

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 33 Test Start 10/21/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	
		Day of Analysis										
12611	T (°C)	23.2/23.1	24.1/23.1	22.7	23.4/22.4	22.8/22.7	23.1/22.9	22.8/22.9	22.7/22.7	22.7/22.6	22.8/22.7	
	pH		8.0	8.0				7.9		7.8	7.8	
	DO (mg/L)		8.3	8.3				8.1		7.5	7.7	
	Conductivity A+H Amm	X	X	265	X	X	X	X	X	X	265	
12612	T (°C)			22.7								
	pH		8.0	8.0				7.9		7.7	7.7	
	DO (mg/L)		8.1	8.2				8.3		7.6	7.5	
	Conductivity A+H Amm	X	X	270	X	X	X	X	X	X	270	
12613	T (°C)			23.0								
	pH		7.9	7.9				7.9		7.7	7.7	
	DO (mg/L)		8.0	8.3				8.4		7.7	7.6	
	Conductivity A+H/Amm.	X	X	275	X	X	X	X	X	X	280	
12614	T (°C)			22.7								
	pH		7.9	7.9				7.9		7.7	7.7	
	DO (mg/L)		8.0	8.1				8.3		7.6	7.5	
	Conductivity A+H/Amm.	X	X	275	X	X	X	X	X	X	280	
	Init./Date (1999):	11/23 [illegible]	11/24 [illegible]	11/25 JM	11/26 [illegible]	11/27 [illegible]	11/28 JM	11/29 [illegible]	11/30 TM	12/1 TM	~~12/2~~ TM	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21,~~ 28, ~~35, and end of~~ test.

Review: [illegible] Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000140

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 33 Test Start 10/21/99

Sample	Parameter	Day of Analysis 33	34	35	36	37	38	39	40	41	42	
12622	T (°C)		22.7	22.6								
	pH		7.9	7.9				7.9		7.7	7.7	
	DO (mg/L)	~~8.0~~	8.0	8.1				8.4		7.3	7.4	
	Conductivity A/H/Amm.	X	X	285	X	X	X	X	X	X	280	
12638	T (°C)			22.7								
	pH		7.9	7.8				7.9		7.7	7.7	
	DO (mg/L)	~~8.2~~	8.2	8.0				8.4		7.6	7.5	
	Conductivity A/H/Amm.	X	X	265	X	X	X	X	X	X	280	
12639	T (°C)			22.5								
	pH		7.9	7.8				7.9		7.6	7.6	
	DO (mg/L)	~~8.1~~	8.1	8.0				8.4		7.0	7.3	
	Conductivity A/H/Amm.	X	X	280	X	X	X	X	X	X	285	
12640	T (°C)			22.5								
	pH		7.9	7.8				7.8		7.7	7.6	
	DO (mg/L)	7.8	7.8	8.1				8.3		7.4	7.3	
	Conductivity A/H/Amm.	X	X	275	X	X	X	X	X	X	285	
	Init./Date (1999):	11/23	11/24	11/25	11/26	11/27	11/28	~~11/29~~	11/30	12/1	12/2	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21~~, 28, 35~~, and end of test~~.

Review: _____ Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

001141

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 33 Test Start 10/21/99

		Day of Analysis										
Sample	**Parameter**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	
12641	T (°C)		2JM	22.5								
	pH		7.9	7.8				7.8		7.7	7.6	
	DO (mg/L)	8.8	8.0	8.2				8.2		7.4	7.4	
	Conductivity ATH/AMM	X	X	270	X	X	X	X	X	X	280	
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		
	Init./Date (1999):	11/23	11/24	11/25 JM	11/26	11/27	11/28	11/29	11/30	12/1 JM	12/2 JM	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, ~~14, 21,~~ 28, ~~35, and end of~~ test.

Review: ______ Date: 12/24/97
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000142

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3641
	Test Start: October 22, 1999	Day 28: November 19, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12664	A	10	LS	—	—	10	-	-	-
	B	10	JG	—	—	10	-	-	-
	C	9	J	—	—	9	-	-	-
	D	10	LS	—	—	10	-	-	-
	E	9	LS	—	—	9	-	-	-
	F	10	JG	—	—	10	-	-	-
	G	4	RB	0	RB	4	-	-	-
	H	9	RB	—	—	9	-	-	-
	I	9	JG	—	—	9	9	22.26	26.98
	J	9	LS	—	—	9	9	22.88	27.13
	K	9	LS	—	—	9	9	25.23	28.56
	L	10	J	—	—	10	10	24.30	28.35
12665	A	10	J	—	—	10	-	-	-
	B	10	J	—	—	10	-	-	-
	C	10	LS	—	—	10	-	-	-
	D	9	J	—	—	9	-	-	-
	E	8	J	—	—	8	-	-	-
	F	7	LS	—	—	7	-	-	-
	G	9	JG	—	—	9	-	-	-
	H	7	J	—	—	7	-	-	-
	I	9	JG	—	—	9	9	22.47	27.44
	J	8	J	—	—	8	8	26.22	31.70
	K	10	LS	—	—	10	10	24.30	32.13
	L	10	LS	—	—	10	10	22.60	28.30
12666	A	4	J	—	—	4	-	-	-
	B	8	RB	—	—	8	-	-	-
	C	10	JG	—	—	10	-	-	-
	D	5	J	0	RB	5	-	-	-
	E	5	J	—	—	5	-	-	-
	F	8	TM	—	—	8	-	-	-
	G	8	J	—	—	8	-	-	-
	H	6	J	0	RB	6	-	-	-
	I	9	RB	—	—	9	9	25.63	29.91
	J	5	LS	—	—	5	5	26.53	30.76
	K	8	RB	—	—	8	8	24.83	29.49
	L	8	LS	—	—	8	8	25.24	30.43

Balance QC: Initial (20 mg = 20.00 [illegible]) Final (20 mg = 20.[illegible]) Balance Asset #:

Date/time In 11/21/99 [illegible] Temp(°C) 81 Init. TM Date/time out Temp(°C) Init.

Comments. Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

Reviewer [signature] Date 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test Day 28 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3641
	Test Start: October 22, 1999	Day 28: November 19, 1999

Sample	Repl.	# Alive	11/16/99 Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12668	A	5	JG	0	RB	5	-	-	-
	B	8	JG	~~0~~	RB	8	-	-	-
	C	10	RB	—	—	10	-	-	-
	D	7	JG	0	RB	7	-	-	-
	E	10	RB	—	—	10	-	-	-
	F	8	RB	0	RB	8	-	-	-
	G	7	LS	~~0~~	RB ~~0~~	7 ~~RS~~	-	-	-
	H	3	J	~~0~~ RB	~~RB~~ RB	3	-	-	-
	I	6	TM	0	RB	6	6	25.87	29.55
	J	9	RB	—	—	9	9	25.08	28.11
	K	8	J	0	RB	8	8	24.52	28.37
	L	7	J	0	RB	7	7	24.69	28.03
12671	A	6	J	0	RB	6	-	-	-
	B	9	J	—	—	9	-	-	-
	C	10	LS	—	—	10	-	-	-
	D	9	LS	—	—	9	-	-	-
	E	9	J	—	—	9	-	-	-
	F	10	LS	—	—	10	-	-	-
	G	9	J	—	—	9	-	-	-
	H	10	J	—	—	10	-	-	-
	I	9	JG	—	—	9	9	23.50	28.14
	J	6	~~LS~~	—	—	6	6	22.49	25.43
	K	8	LS	—	—	8	8	26.25	29.96
	L	9	JG	—	—	9	9	24.84	28.09
	A						-	-	-
	B						-	-	-
	C						-	-	-
	D						-	-	-
	E						-	-	-
	F						-	-	-
	G						-	-	-
	H						-	-	-
	I								
	J								
	K								
	L								

Balance QC: Initial (20 mg = 20.00) Final (20 mg = 20.00) Balance Asset #:

Date/time In 11/29 17:30 Temp(°C) 81 Init. TM Date/time out Temp(°C) Init.

Comments: Organisms in Replicates A - H transferred to water only exposure. Organisms in Replicates I - L to dry weight analysis.

Reviewer: J Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3641
	Test Start: 10/22/99	Test End: 12/03/99

		Day 35 (11/26/99)		Day 42 (12/03/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12664	A	9	6	8	6	2	2	8	29.54	31.78
	B	10	2	9	5	4	10	9	26.05	29.02
	C	9	3	8	3	5	7	8	27.56	30.32
	D	8	11	8	4	4	11	8	23.47	26.28
	E	8	0	8	2	~~8~~ 6	1	8	27.84	31.00
	F	9	8	9	7	2	~~8~~ 9	9	28.82	32.11
	G	4	2	4	3	1	4	4	26.97	28.21
	H	9	4	9	5	4	11	9	28.78	32.33
12665	A	9	2	9	4	5	34	9	24.60	29.03
	B	11	12	11	4	7	21	11	27.27	31.53
	C	10	13	9	6	3	35	9	25.55	29.79
	D	9	3	8	4	4	12	8	25.62	29.65
	E	8	6	8	5	3	8	8	25.09	30.44
	F	7	2	7	3	4	25	7	23.39	28.12
	G	8	9	6	5	1	7	6	27.37	30.85
	H	6	6	6	3	3	10	6	27.28	28.50
12666	A	3	0	3	2	1	1	3	29.11	30.98
	B	8	6	8	6	2	6	8	23.50	27.15
	C	9	2	10	5	5	3	10	23.21	26.96
	D	5	2	5	2	3	6	5	24.04	26.16
	E	5	1	5	3	2	1	5	28.74	30.81
	F	7	10	7	2	5	11	7	25.62	28.55
	G	8	0	8	4	4	1	8	27.14	~~30.42~~ 30.97
	H	6	0	6	3	3	4	6	30.88	33.77
12668	A	5	2	5	2	3	5	5	28.25	30.42
	B	7	2	6	4	2	6	6	26.09	28.12
	C	8	7	8	3	5	3	8	24.55	27.42
	D	6	5	4	4	0	10	4	25.97	26.72
	E	10	3	8	3	5	2	8	27.50	29.89
	F	7	6	7	6	1	2	7	29.25	30.97
	G	6	1	6	5	1	10	6	25.25	27.08
	H	3	0	3	1	2	0	3	21.94	22.54

Day 35 Initials / Date: JG 11/26/99 | Day 42 Initials / Date: JG 12/3/99 YS

Balance QC Initial (20 mg = 19.97 | Final (20 mg = 19.97 | Balance Asset #:

Date/time in 12/3 4:05 Temp(°C) 80 Init. YS | Date/time out: 12/4 16:20 Temp(°C) 80°C Init. YS

(1) Correction 12/3/99

Reviewer ________ Date 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Chronic Toxicity Test
Days 35 and 42 Survival, Reproduction, and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3641
	Test Start: 10/22/99	Test End: 12/03/99

		Day 35 (11/26/99)		Day 42 (12/03/99)						
Sample	Rep	# Adults	# Neonates	# Adults	# Females	# Males	# Neonates	# Weighed	Init Pan Wt.	Total Dry Wt.
12671	A	5	2	4	2	2	7	4	29.18	30.58
	B	9	2	8	2	6	12	8	28.67	31.47
	C	10	6	10	6	~~[illegible]~~ 4	25	10	24.30	27.45
	D	9	0	9	2	7	0	9	21.15	24.57
	E	9	10	9	5	4	12	9	28.62	31.94
	F	9	4	① ~~7~~ 9	3 ~~2~~ ①	~~8~~ 6 ①	2	9	25.20	28.33
	G	9	3	9	5	4	13	9	30.01	33.62
	H	8	1	8	1	7	0	8	24.77	27.14
	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									
	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									
	A									
	B									
	C									
	D									
	E									
	F									
	G									
	H									

Day 35 Initials / Date: JG 11/26/99	Day 42 Initials / Date: RB

Balance QC: Initial (20 mg =) Final (20 mg =) Balance Asset #:

Date/time In	Temp(°C)	Init.	Date/time out	Temp(°C)	Init.

Reviewer: J Date: 12/22/99 ① Correction J 12/3/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Hyalella azteca chronic
Initial Weight Results
10/22/99

Menzie Cura
Dead Creek
99033

BTRs 3641, 3643
Aquatec Biological Sciences

Initial Dry Weight Data					
Replicate	# Weighed	Initial Boat Weight (mg)	Final Dry Weight (mg)	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
1	10	43.37	44.91	0.154	
2	10	37.51	39.16	0.165	
3	10	38.19	39.62	0.143	
4	10	37.15	38.72	0.157	
5	10	36.97	38.43	0.146	
6	10	41.48	42.74	0.126	
7	4	45.28	45.59	0.078	
8	10	46.18	47.71	0.153	0.140

Hyalella azteca Initial Dry Wt.

Project: H. a. 10/22/99	
Culture ID: batch 10/15/99	Age: 7

Replicate	Number of Organisms weighed	Initial Pan Weight (mg)	Final Pan Weight (mg)
1	10	43.366	44.91
2	10	37.510	39.16
3	10	38.186	39.62
4	10	37.147	38.72
5	10	36.969	38.43
6	10	41.477	42.74
7	~~13~~ ~~10~~ 4	45.281	45.59
8	10	46.184	47.71
Initials:			
Date:			

Balance QC: Initial (20 mg = 19.96)	Final (20 mg = 19.96)	Balance Asset #:	
Date/time In 12/4 10:50 Temp(°C) 82°C Init. JS	Date/time out 12/5 12:00 Temp(°C) 80		Init. JG
Comments:			

000148

Reviewer: J Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Hyalella azteca

Source: Lab reared ✓ Hatchery reared ______ Field collected ______

Hatch date 10/15/99 Receipt date ______

Lot number 101599HA Strain ARO

Brood Origination USFWS, MO

II. Water Quality

Temperature 24 °C Salinity — ppt DO 7.6

pH 7.5 Hardness ~180 ppm

III. Culture Conditions

System: FW STATIC RENEWAL

Diet: Flake Food ✓ Phytoplankton ______ Trout Chow ✓

Brine Shrimp ______ Rotifers ______ Other ______

Rec 10/19/99
Temp 17.0 °C

Prophylactic Treatments: ______

Comments: < 24's old

______

IV. Shipping Information

Client: AQUATECH VT. # of Organisms: 1000+

Carrier: FED EX Date Shipped: 10/18/99

Biologist: Stan [signature]

Test Start
102199 JM

T = 23 [illegible]
pH = 7.9
D.O = 8.0
Hard = 400

1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/22/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12664	T (°C)	21.6	21.9/22.0	21.0/21.2	22.4/22.9	22.1/21.8	21.9/22.0	22.0/22.0	22.5/22.2	22.3/22.4	22.7/22.2	22.0/22.4
	pH	8.0	—	—	7.9		7.9		7.9	—	—	7.9
	DO (mg/L)	7.9	—	—	7.0		6.7		6.6	—	—	7.4
	Conductivity Ammonia/A+H	380 ✓	X	X	X	X	X	X		X	X	X
12665	T (°C)	22.0							22.1/22.1	21.9/22.0		
	pH	7.8	—	—	7.6		7.6		7.7	—	—	8.1
	DO (mg/L)	7.1	—	—	4.9		4.9		5.4	—	—	6.5
	Conductivity Ammonia A+H	355 ✓	X	X	X	X	X	X		X	X	X
12666	T (°C)	22.2							21.9/21.8	21.7		
	pH	7.7	—	—	7.4		7.4		7.4	—	—	7.5
	DO (mg/L)	7.0	—	—	4.9*		4.1		4.4	—	—	5.1
	Conductivity Ammonia/A+H	360 ✓	X	X	X	X	X	X		X	X	X
12668	T (°C)	22.9							22.7/22.7			
	pH	7.6	—	—	7.8		7.8		7.8	—	—	7.8
	DO (mg/L)	8.1	—	—	7.2		7.2		6.7	—	—	6.8
	Conductivity Ammonia/A+H	350 ✓	X	X	X	X	X	X		X	X	X
	Init./Date (1999):	10/22 MM	10/23 JG	10/24 JG	10/25 [illegible]	10/26 MM	10/27 MM	10/28 MM	10/29 JG	10/30 JG	10/31 JG	11/1 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

10/24 heater adjusted in H_2O bath to raise test temp. JG

Review: [signature] Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/22/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12671	T (°C)	22.2							~~22.5~~ 22.4			
	pH	7.9	–	–	8.1		8.5		8.5	–	–	8.4
	DO (mg/L)	7.4	–	–	6.0		6.1		5.9	–	–	6.8
	Conductivity Ammonia/Alk/H	340 ✓	X	X	X	X	X	X		X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	Init./Date (1999):	10/22 JM	10/23 JG	10/24 JG	10/25	10/26 JM	10/27 JM	10/28 JM	10/29	10/30	~~10/31~~ JG	11/1 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

Review: [signature] Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont.

000151

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3615~~ 3641 Test Start 10/~~19~~ 22/99

Sample	Parameter	11	12	13	14	15	16	17	18	19	20	21
		Day of Analysis										
12664	T (°C)	22.6 / 22.3	22.9 / 22.7	22.1 / 22.4	22.2 / 22.0	22.2 / 21.6	21.9 / 21.8	22.2 / 22.0	22.0 / 22.2	22.3 / 22.6	22.2 / 22.3	22.0 / 22.0
	pH		8.0		8.0			8.0		7.9	7.9	8.0
	DO (mg/L)		7.2		7.6			7.7		7.1	7.5	7.6
	Conductivity	X	X	X	320 ✓	X	X	X	X	X	310 ✓	X
12665	T (°C)				[illegible]							
	pH		8.3		8.0			8.4		7.9	8.2	8.2
	DO (mg/L)		6.0		5.9			6.4		4.9	5.6	6.7
	Conductivity	X	X	X	320 ✓	X	X	X	X	X	330 ✓	X
12666	T (°C)											
	pH		7.4		7.4			7.4		7.4	7.4	7.5
	DO (mg/L)		4.4		4.9			5.0		3.5	3.9	5.9
	Conductivity	X	X	X	310 ✓	X	X	X	X	X	310 ✓	X
12668	T (°C)											
	pH		7.8		7.8			7.8		7.8	7.8	7.9
	DO (mg/L)		6.9		7.3			7.7		7.4	7.4	7.9
	Conductivity	X	X	X	290 ✓	X	X	X	X	X	300 ✓	X
	Init./Date (1999):	11/2 JM	11/3 JG	11/4	11/5	11/6	11/7 JM	11/8 JG	11/9 JM	11/10 JM	11/11 JM	11/12 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

Review: ______ Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3615~~ 3641 Test Start 10/~~19~~ 22/99

Sample	Parameter	11	12	13	14	15	16	17	18	19	20	21
		Day of Analysis										
12671	T (°C)											
	pH		8.5	[illegible]	8.4			8.4	8.2	8.2	8.2	8.1
	DO (mg/L)		6.4		6.7			6.7	5.9	5.9	6.5	7.4
	Conductivity	X	X	X	318	X	X	X	X	X	310	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	Init./Date (1999):	11/2 JM	11/3 JG	11/4	11/5	11/6	11/7 JM	11/8 JG	11/9 JM	11/10 JM	11/11 JM	11/12 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000153

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/22/99

Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
		Day of Analysis										
12664	T (ºC)	22.5/22.3	21.7/22.5	22.2/22.1	22.1/22.0	22.0/22.3	21.6/22.2	22.1/23	23.0/23.4	23.2/22.7	23.7/23.8	23.2/24.3
	pH			8.0		7.9		7.9			8.0	
	DO (mg/L)			8.0		7.6		7.6			8.3	
	Conductivity	X	X	X	X	X	X	310 ✓	X	X	X	X
12665	T (ºC)											
	pH			8.2		8.2		7.9			8.0	
	DO (mg/L)			6.8		7.0		7.0			8.3	
	Conductivity	X	X	X	X	X	X	330 ✓	X	X	X	X
12666	T (ºC)											
	pH			7.7		7.7		7.6			8.0	
	DO (mg/L)			5.9		6.1		7.0			8.2	
	Conductivity	X	X	X	X	X	X	340 ✓	X	X	X	X
12668	T (ºC)											
	pH			7.9		7.8		7.7			8.0	
	DO (mg/L)			7.8		7.4		7.5			8.4	
	Conductivity	X	X	X	X	X	X	320 ✓	X	X	X	X
	Init./Date (1999):	11/13 JG	11/14 JM	11/15 JG	11/16	~~11/17~~ JG	11/18 CO	11/19 CW	11/20 JG	11/21 JM	11/22 JG	11/23 CW

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 21, 28, 35, and end of test.

Review: J Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/22/99

Sample	Parameter	Day of Analysis 22	23	24	25	26	27	28	29	30	31	32
12671	T (°C)											
	pH			7.8		7.8		7.8			7.9	
	DO (mg/L)			6.9		6.8		6.6			8.1	
	Conductivity	X	X	X	X	X	X	370	X	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	Init./Date (1999):	11/13 JG	11/14 JM	11/15 JG	11/16	11/17 JG	11/18	11/19	11/20	11/21 JM	11/22 JG	11/23

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 21, 28, 35, and end of test.

Review: ____ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000155

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/22/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	
		Day of Analysis										
12664	T (°C)	23.0/23.2	22.7/22.6	23.1/22.7	22.7/22.8	22.3/22.2	22.5/22.5	21.9/22.0	22.7/22.3	22.9/22.7	22.5	
	pH	7.9		7.9			7.9		7.8		7.8	
	DO (mg/L)	7.8		8.1			8.1		7.8		7.9	
	Conductivity	X	X	260	X	X	X	X	X	X	290	
12665	T (°C)										22.6	
	pH	7.8		7.9			7.9		7.6		7.8	
	DO (mg/L)	7.8		8.2			8.2		6.8		7.4	
	Conductivity	X	X	270	X	X	X	X	X	X	290	
12666	T (°C)										22.5	
	pH	7.9		7.8			7.8		7.6		7.7	
	DO (mg/L)	7.9		7.9			8.2		7.2		7.5	
	Conductivity	X	X	270	X	X	X	X	X	X	290	
12668	T (°C)										22.5	
	pH	7.8		7.8			7.8		7.6		7.7	
	DO (mg/L)	7.9		7.9			8.3		7.1		7.5	
	Conductivity	X	X	270	X	X	X	X	X	X	290	
	Init./Date (1999):	11/24 WC	11/25	11/26	11/27 JG	11/28	11/29 JG	11/30	12/1	12/2	12/3 JG	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 21, 28, 35, and end of test.

Review: ________ Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000156

Amphipod (*Hyalella azteca*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/22/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	
		Day of Analysis										
12671	T (°C)										22.5	
	pH	7.9		7.9			7.8		7.6		7.7	
	DO (mg/L)	8.0		8.1			8.3		7.2		7.3	
	Conductivity	X	X	280	X	X	X	X	X	X	280	
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		
	Init./Date (1999):	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2	12/3	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 21, 28, 35, and end of test.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000157

ALKALINITY AND HARDNESS

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
12546									
	10/19/99	50	0.2	2.3	42	50	0.1	11.6	230.0
	11/2/99	50	29.1	31	38	50	36	42.7	134.0
	11/8/99	50	22.9	24.4	30	30	37.8	41.1	110.0
	11/16/99	50	18.3	20	34	50	27.1	32.2	102.0
Avg					36.0				144.0
Min					30				102
Max					42				230
12547									
	10/19/99	50	2.3	4.6	46	30	11.6	17.7	203.3
	11/2/99	50	31	32.9	38	50	42.7	49.1	128.0
	11/8/99	50	24.4	26	32	30	41.1	44.2	103.3
	11/16/99	50	20	21.5	30	50	32.2	36.9	94.0
Avg					36.5				132.2
Min					30				94
Max					46				203
12548									
	10/19/99	50	4.6	6.9	46	50	17.7	26.8	182.0
	11/2/99	50	32.9	34.9	40	50	1.5	8.7	144.0
	11/8/99	50	26	28	40	30	44.2	47.8	120.0
	11/16/99	50	21.5	23.2	34	50	36.9	41.9	100.0
Avg					40.0				136.5
Min					34				100
Max					46				182
12549									
	10/19/99	50	6.9	9.1	44	50	26.8	36.7	198.0
	11/2/99	50	34.9	37	42	50	8.7	15.9	144.0

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
	11/8/99	50	29.5	31.3	34	30	3.7	7	110.0
	11/16/99	50	23.2	24.7	30	50	41.9	46.6	94.0
Avg					37.5				136.5
Min					30				94
Max					44				198
12550									
	10/19/99	50	9.1	11.2	42	50	36.7	45.7	180.0
	11/2/99	50	37	38.9	38	50	15.9	23	142.0
	11/8/99	50	31.3	33	34	30	7	10.5	116.7
	11/16/99	50	24.7	26.2	30	50	0.3	5.2	98.0
Avg					36.0				134.2
Min					30				98
Max					42				180
12551									
	10/19/99	50	11.2	13.4	44	50	0.1	9	178.0
	11/2/99	50	38.9	40.8	38	50	23	30.3	146.0
	11/8/99	50	34.7	36.5	38	30	14.5	18.5	133.3
	11/16/99	50	26.2	27.8	32	50	5.2	10.4	104.0
Avg					38.0				140.3
Min					32				104
Max					44				178
12552									
	10/19/99	50	13.4	15.9	50	50	9	19.6	212.0
	11/2/99	50	40.8	42.4	32	50	30.3	36.9	132.0
	11/8/99	50	38.2	39.8	32	30	21.8	25.2	113.3
	11/16/99	50	27.8	29.2	28	50	10.4	14.8	88.0
Avg					35.5				136.3
Min					28				88
Max					50				212

Sample Number	*Date*	*Alkalinity Volume (mls)*	*Initial Titrant*	*Final Titrant*	*Alkalinity (mg/l)*	*Hardness Volume (mls)*	*Initial Titrant*	*Final Titrant*	*Hardness (mg/l)*
12589									
	10/20/99	50	22.5	24.3	36	50	14.8	20.6	116.0
	11/3/99	50	11.4	13.3	38	50	38.6	45.5	138.0
	11/9/99	50	32.3	33.9	32	50	17	23.1	122.0
	11/17/99	50	36.3	38.1	36	30	42.9	46.4	116.7
Avg					*35.5*				*123.2*
Min					*32*				*116*
Max					*38*				*138*
12590									
	10/20/99	50	24.3	26.1	36	50	20.6	26.6	120.0
	11/3/99	50	13.3	15.1	36	50	0.3	7	134.0
	11/9/99	50	33.9	35.3	28	50	23.1	28.8	114.0
	11/17/99	50	38.1	41.1	60	30	0	3.3	110.0
Avg					*40.0*				*119.5*
Min					*28*				*110*
Max					*60*				*134*
12591									
	10/20/99	50	26.1	27.7	32	40	26.6	35	210.0
	11/3/99	50	15.1	16.6	30	50	7	13.9	138.0
Avg					*31.0*				*174.0*
Min					*30*				*138*
Max					*32*				*210*
12592									
	10/20/99	50	27.7	29.4	34	20	35	37.3	115.0
	11/3/99	50	16.6	18.5	38	50	13.9	20.9	140.0
	11/9/99	50	35.3	36.7	28	50	28.8	34.3	110.0
	11/17/99	50	41.1	42.8	34	30	3.3	6.7	113.3

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
Avg					33.5				119.6
Min					28				110
Max					38				140
12593									
	10/20/99	25	29.4	30.3	36	20	37.3	40.1	140.0
	11/3/99	50	18.5	20.1	32	40	20.9	27	152.5
	11/9/99	50	36.7	38.1	28	50	34.3	40.5	124.0
	11/17/99	50	42.8	44.5	34	30	5.7	10	110.0
Avg					32.5				131.6
Min					28				110
Max					36				153
12609									
	10/20/99	50	30.3	32.3	40	30	40.1	44.5	146.7
	11/3/99	50	20.1	22.1	40	50	27	34	140.0
	11/9/99	50	38.1	39.9	36	50	40.5	46.7	124.0
	11/17/99	50	44.5	46.4	38	30	10	13.4	113.3
Avg					38.5				131.0
Min					36				113
Max					40				147
12610									
	10/20/99	50	32.3	34.2	38	40	0.2	6.7	162.5
	11/3/99	50	22.1	24.1	40	50	34	41.1	142.0
	11/9/99	50	39.9	41.5	32	50	0.6	6.4	116.0
	11/17/99	50	46.4	48.2	36	30	13.4	16.9	116.7
Avg					36.5				134.3
Min					32				116
Max					40				163
12611									
	10/21/99	50	0.4	2.6	44	50	15.7	24.3	172.0

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
	11/10/99	50	8.9	10.3	28	50	19.4	27.1	154.0
	11/18/99	50	0.8	2.6	36	50	36.8	44.7	158.0
Avg					*36.0*				*161.3*
Min					*28*				*154*
Max					*44*				*172*
12612									
	10/21/99	50	2.6	4.5	38	50	24.3	32.4	162.0
	11/10/99	50	10.3	11.8	30	50	27.1	34.2	142.0
	11/18/99	50	2.6	4.2	32	50	0.2	7	136.0
Avg					*33.3*				*146.7*
Min					*30*				*136*
Max					*38*				*162*
12613									
	10/21/99	50	4.5	6.4	38	50	32.4	40.5	162.0
	11/10/99	50	11.8	13.4	32	50	34.2	40.1	118.0
	11/18/99	50	4.2	5.9	34	50	7	13.7	134.0
Avg					*34.7*				*138.0*
Min					*32*				*118*
Max					*38*				*162*
12614									
	10/21/99	50	6.4	8	32	50	0.1	8	158.0
	11/10/99	50	13.4	14.4	20	50	40.1	47.6	150.0
	11/18/99	50	5.9	7.9	40	50	13.7	21	146.0
Avg					*30.7*				*151.3*
Min					*20*				*146*
Max					*40*				*158*
12615									
	10/20/99	50	1.8	4.2	48	40	29.1	34.4	132.5
	11/3/99	50	31.4	33.1	34	50	23.1	29.5	128.0

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
	11/9/99	50	47.6	48.8	24	50	33.3	38.8	110.0
	11/17/99	50	0.6	2	28	30	16.9	20.2	110.0
Avg					33.5				120.1
Min					24				110
Max					48				133
12622									
	10/21/99	50	8	10.2	44	50	8	17.6	192.0
	11/10/99	50	14.4	16	32	50	0.9	7.2	126.0
	11/18/99	50	7.9	9.3	28	50	21	27.1	122.0
Avg					34.7				146.7
Min					28				122
Max					44				192
12638									
	10/21/99	50	10.2	12.1	38	50	17.6	25.3	154.0
	11/10/99	50	16	17.5	30	50	7.2	14.6	148.0
	11/18/99	50	9.3	10.9	32	50	27.1	33.5	128.0
Avg					33.3				143.3
Min					30				128
Max					38				154
12639									
	10/21/99	30	12.1	13.2	37	20	25.3	28.7	170.0
	11/10/99	50	17.5	19.1	32	50	14.6	22.4	156.0
	11/18/99	50	10.9	12.6	34	50	33.5	40.5	140.0
Avg					34.2				155.3
Min					32				140
Max					37				170
12640									
	10/21/99	50	13.2	14.6	32	50	28.7	37.8	182.0
	11/10/99	50	19.1	20.4	26	50	22.4	29	132.0

Sample Number	*Date*	*Alkalinity Volume (mls)*	*Initial Titrant*	*Final Titrant*	*Alkalinity (mg/l)*	*Hardness Volume (mls)*	*Initial Titrant*	*Final Titrant*	*Hardness (mg/l)*
	11/18/99	50	12.6	14.5	38	50	40.5	46.8	126.0
Avg					*32.0*				*146.7*
Min					*26*				*126*
Max					*38*				*182*
12641									
	10/21/99	50	14.8	16.9	42	50	37.8	46.5	174.0
	11/10/99	50	20.4	22	32	50	29	36	140.0
	11/18/99	50	14.5	16.2	34	50	0.4	7.3	138.0
Avg					*36.0*				*150.7*
Min					*32*				*138*
Max					*42*				*174*
12664									
	10/22/99	50	9.7	11.2	30	50	11.3	17.3	120.0
	11/5/99	50	42.4	44.1	34	50	18.3	23.9	112.0
	11/11/99	50	22	23.5	30	50	20.8	27.2	128.0
	11/19/99	50	16.2	18.4	44	50	7.3	14.8	150.0
Avg					*34.5*				*127.5*
Min					*30*				*112*
Max					*44*				*150*
12665									
	10/22/99	50	11.2	13.1	38	50	17.3	22.8	110.0
	11/5/99	50	44.1	46.1	40	50	23.9	30	122.0
	11/11/99	50	23.5	25	30	50	27.2	33.4	124.0
	11/19/99	50	18.4	20.2	36	50	14.8	22.5	154.0
Avg					*36.0*				*127.5*
Min					*30*				*110*
Max					*40*				*154*
12666									
	10/22/99	50	13.1	15	38	50	22.8	28.2	108.0

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
	11/5/99	50	46.1	47.9	36	50	0.3	5.9	112.0
	11/11/99	50	26.8	28.3	30	50	40.8	46.9	122.0
	11/19/99	50	22.1	24.1	40	50	30.2	37.9	154.0
Avg					36.0				124.0
Min					30				108
Max					40				154
12669									
	10/22/99	50	15	15.6	32	50	28.2	33.1	98.0
	11/5/99	50	47.9	49.5	32	50	5.9	10.9	100.0
	11/11/99	50	28.3	29.4	22	50	0.1	5.6	110.0
	11/19/99	50	24.1	25.6	30	50	37.9	44.2	126.0
Avg					29.0				108.5
Min					22				98
Max					32				126
12671									
	10/22/99	50	16.6	18.3	34	50	33.1	38	98.0
	11/5/99	50	0.1	1.8	34	50	10.9	17	122.0
	11/19/99	50	27.3	29.1	36	50	6.8	14.8	156.0
Avg					34.7				125.3
Min					34				98
Max					36				156

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3615
Sample Description: Day 0 10/19		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12546	10/19	50ml	0.2	2.3	12/2 YS	50ml	0.1	11.6	12/7 YS	12/21 YS
47			2.3	4.6		30ml	11.6	17.7		
48			4.6	6.9		50ml	17.7	26.8		
49			6.9	9.1			26.8	30.7		
50			9.1	11.2			30.7	45.7		
51			11.2	13.4			0.1	9.0		
52			13.4	15.9			9.0	19.6		

J 12/8/99

Alkalinity and Hardness Analysis

Client: Menzie Cura Project: 99033 BTR: Several

Sample Description: Day 0 H.a. 10/20 Chronic

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12589	10/20	50ml	22.5	24.3	12/8 JB	50ml	14.8	20.6	JB	12/8 JB
90			24.3	26.1			20.6	26.6		
91			26.1	27.7		40ml	26.6	35.0		
92			27.7	29.4		20ml	35.0	37.3		
93		25ml	29.4	30.3			37.3	40.1		
12609		50ml	30.3	32.3		30ml	40.1	44.5		
610			32.3	34.2		40ml	0.2	6.7		
611			34.2	35.8		50ml	6.7	12.1		
612			35.8	37.5			12.1	17.7		
613			37.5	39.2			17.7	23.6		
614			0.1	1.8			23.6	29.1		
615			1.8	4.2		40ml	29.1	34.4		
622			4.2	6.1		50ml	34.4	39.7		

000167

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3629
Sample Description: Day 0 Ha. 10/21		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12611	10/21	50ml	0.4	2.6	12/2 YS	50ml	15.7	24.3	12/7 YS	12/21 YS
12			2.6	4.5			24.3	32.4		
13			4.5	6.4			32.4	40.5		
14			6.4	8.0			0.1	8.0		
12622			8.0	10.2			8.0	17.6		
38			10.2	12.1			17.6	25.3		
39		30ml	12.1	13.2		20ml	25.3	28.7		
40		50ml	13.2	14.8		50ml	28.7	37.8		
41			14.8	16.9			37.8	46.5		

000168

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: Day 0		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12665	10/21	50ml	6.1	7.6	12/8 YS	50ml	0.5	6.1	12/8 YS	12/8 YS
12668	⊥	⊥	7.6	9.7	⊥	⊥	6.1	11.3	⊥	
12664	10/22	50ml	9.7	11.2	12/8 YS	50ml	11.3	17.3	12/8 YS	
665			11.2	13.1			17.3	22.8		
666			13.1	15.0			22.8	28.2		
668			15.0	16.6			28.2	33.1		
671	⊥	⊥	16.6	18.3	⊥	—	33.1	38.0	⊥	⊥

Ha
Chronic

000169

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: Days 28 H.A.		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12546	11/16/98	50ml	18.3	20.0	12/8 98	50ml	27.1	32.2	12/8/98	12/9/98
47			20.0	21.5			32.2	36.9		
48			21.5	23.2			36.9	41.9		
49			23.2	24.7			41.9	46.6		
50			24.7	26.2			0.3	5.2		
51			26.2	27.8			5.2	10.4		
52			27.8	29.2			10.4	14.8		

000170

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: Day 28 H.a. + Ct.		

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
H.a.	12589	11/17	50ml	36.3	38.1	11/30 JS	30ml*	42.9	46.4	11/30 JS	JD 12/8
	90			38.1	41.1			0.0	3.3		
	92			41.1	42.8			3.3	6.7		
	93			42.8	44.5			6.7	10.0		
	12609			44.5	46.4			10.0	13.4		
	10			46.4	48.2			13.4	16.9		
	15			0.6	2.0			16.9	20.2		
C.t.	12611	11/17	50ml	2.0	3.6	11/30 JS	30ml	20.2	23.6	11/30 JS	
	12			3.6	5.3			23.6	27.3		
	13			5.3	6.9			27.3	31.4		
	14			6.9	8.5			31.4	34.7		
	22			8.5	10.1			34.7	37.8		

*used 30ml sa[mple] (running out of Calgami[te]) reentered 12/21 JS

000171

Alkalinity and Hardness Analysis

Client: Menzie Cura	Project: 99030	BTR: Several
Sample Description: Day 28		

	Sample ID	Sample Date	ALKALINITY Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	HARDNESS Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
H.a.	12611	11/18	50 ml	0.8	2.6	LS 11/20	50ml	36.8	44.7	11/20 LS	12/[illegible] YS
	12612			2.6	4.2			0.2	7.0		
	12613			4.2	5.9			7.0	13.7		
	12614			5.9	7.9			13.7	21.0		
	12622			7.9	9.3			21.0	27.1		
	12638			9.3	10.9			27.1	33.5		
	12639			10.9	12.6			33.5	40.5		
	12640			12.6	14.5			40.5	46.8		
	12641			14.5	16.2			0.4	7.3		
	12664	11/19		16.2	18.4			7.3	14.8		
	12665	11/19		18.4	20.2			14.8	22.5		
C.t	12665	11/18		20.2	22.1			22.5	30.2		
H.a	12666	11/19		22.1	24.1			30.2	37.9		
H.a	12668	11/19		24.1	25.6			37.9	44.2		
C.t.	12668	11/18		25.6	27.3			0.0	6.8		
H.a.	12671	11/19		27.3	29.1			6.8	14.6		

000172

Ammonia Results Report

Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
12546	BTOX-C-1	HA	10/19	1.4
12546	BTOX-C-1	HA	11/16	0.2
		Avg 0.8	Max 1.4	Min 0.2
12547	BTOX-C-2	IN	10/19	6.2
12547	BTOX-C-2	HA	11/16	0.7
		Avg 3.45	Max 6.2	Min 0.7
12548	BTOX-C-3	IN	10/19	4.1
12548	BTOX-C-3	HA	11/16	0.6
		Avg 2.35	Max 4.1	Min 0.6
12549	BTOX-D-1	IN	10/19	1.7
12549	BTOX-D-1	HA	11/16	0
		Avg 0.85	Max 1.7	Min 0
12550	BTOX-D-2	IN	10/19	2.2
12550	BTOX-D-2	HA	11/16	0
		Avg 1.1	Max 2.2	Min 0
12551	BTOX-D-3	IN	10/19	1.5
12551	BTOX-D-3	HA	11/16	0
		Avg 0.75	Max 1.5	Min 0
12552	HA LCS	IN	10/19	0.2
12552	HA LCS	HA	11/16	0
		Avg 0.1	Max 0.2	Min 0
12589	BTOX-B-1	HA	10/20	0.6

Ammonia Results Report

Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
12589	BTOX-B-1	HA	11/17	0.1
		Avg: 0.35	Max: 0.6	Min: 0.1
12590	BTOX-B-1(DUPE)	HA	10/20	0.3
12590	BTOX-B-1(DUPE)	HA	11/17	0
		Avg: 0.15	Max: 0.3	Min: 0
12592	BTOX-B-3	HA	11/17	0
12592	BTOX-B-3	HA	10/20	0.7
		Avg: 0.35	Max: 0.7	Min: 0
12593	BTOX-M	HA	10/20	2
12593	BTOX-M	HA	11/17	0.1
		Avg: 1.05	Max: 2	Min: 0.1
12609	E-1 DEAD CREEK	HA	11/17	0.4
12609	E-1 DEAD CREEK	HA	10/20	0
		Avg: 0.2	Max: 0.4	Min: 0
12610	E-2 DEAD CREEK	HA	11/17	0
12610	E-2 DEAD CREEK	HA	10/20	1.4
		Avg: 0.7	Max: 1.4	Min: 0
12611	E-3 DEAD CREEK	HA	10/21	2.2
12611	E-3 DEAD CREEK	HA	11/18	0.1
		Avg: 1.15	Max: 2.2	Min: 0.1
12612	BP-1 BORROW PIT	HA	11/18	0.1
12612	BP-1 BORROW PIT	HA	10/21	0.6

Ammonia Results Report

Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
		Avg 0.35	Max 0.6	Min 0.1
12613	BP-1(DUPE) BORRO	HA	10/21	0.6
12613	BP-1(DUPE) BORRO	HA	11/18	0
		Avg 0.3	Max 0.6	Min 0
12614	BP-3 BORROW PIT	HA	10/21	0.8
12614	BP-3 BORROW PIT	HA	11/18	0
		Avg 0.4	Max 0.8	Min 0
12615	HA-LCS	HA	10/20	0.1
12615	HA-LCS	HA	11/17	0
		Avg 0.05	Max 0.1	Min 0
12622	LCS	HA	10/21	0.1
12622	LCS	HA	11/18	0
		Avg 0.05	Max 0.1	Min 0
12638	BP-2 BORROW PIT	HA	11/18	0.1
12638	BP-2 BORROW PIT	HA	10/21	0.9
		Avg 0.5	Max 0.9	Min 0.1
12639	F-1 DEAD CREEK-SE	HA	10/21	0.7
12639	F-1 DEAD CREEK-SE	HA	11/18	0
		Avg 0.35	Max 0.7	Min 0
12640	F-2 DEAD CREEK-SE	HA	10/21	0.1
12640	F-2 DEAD CREEK-SE	HA	11/18	0.1

Ammonia Results Report

Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
		Avg: 0.1	Max: 0.1	Min: 0.1
12641	F-3 DEAD CREEK-SE	HA	11/18	0.1
12641	F-3 DEAD CREEK-SE	HA	10/21	2.1
		Avg: 1.1	Max: 2.1	Min: 0.1
12664	SEDIMENT; 2-1 GALL	IN	10/22	0
12664	SEDIMENT; 2-1 GALL	HA	11/19	0
		Avg: 0	Max: 0	Min: 0
12665	SEDIMENT; 2-1 GALL	IN	10/22	2.1
12665	SEDIMENT; 2-1 GALL	HA	11/19	0.1
		Avg: 1.1	Max: 2.1	Min: 0.1
12666	SEDIMENT; 2-1 GALL	HA	11/19	0.3
12666	SEDIMENT; 2-1 GALL	IN	10/22	1
		Avg: 0.65	Max: 1	Min: 0.3
12668	LCS: 10/8/99 @ : (SE	IN	10/22	0.1
12668	LCS: 10/8/99 @ : (SE	HA	11/19	0
		Avg: 0.05	Max: 0.1	Min: 0
12671	Ref2-2 Refference Bor	HA	11/19	0.1
12671	Ref2-2 Refference Bor	IN	10/22	0.5
		Avg: 0.3	Max: 0.5	Min: 0.1

AMMONIA ANALYSIS

99033

Client: Menzie-Cura Ct. chronic

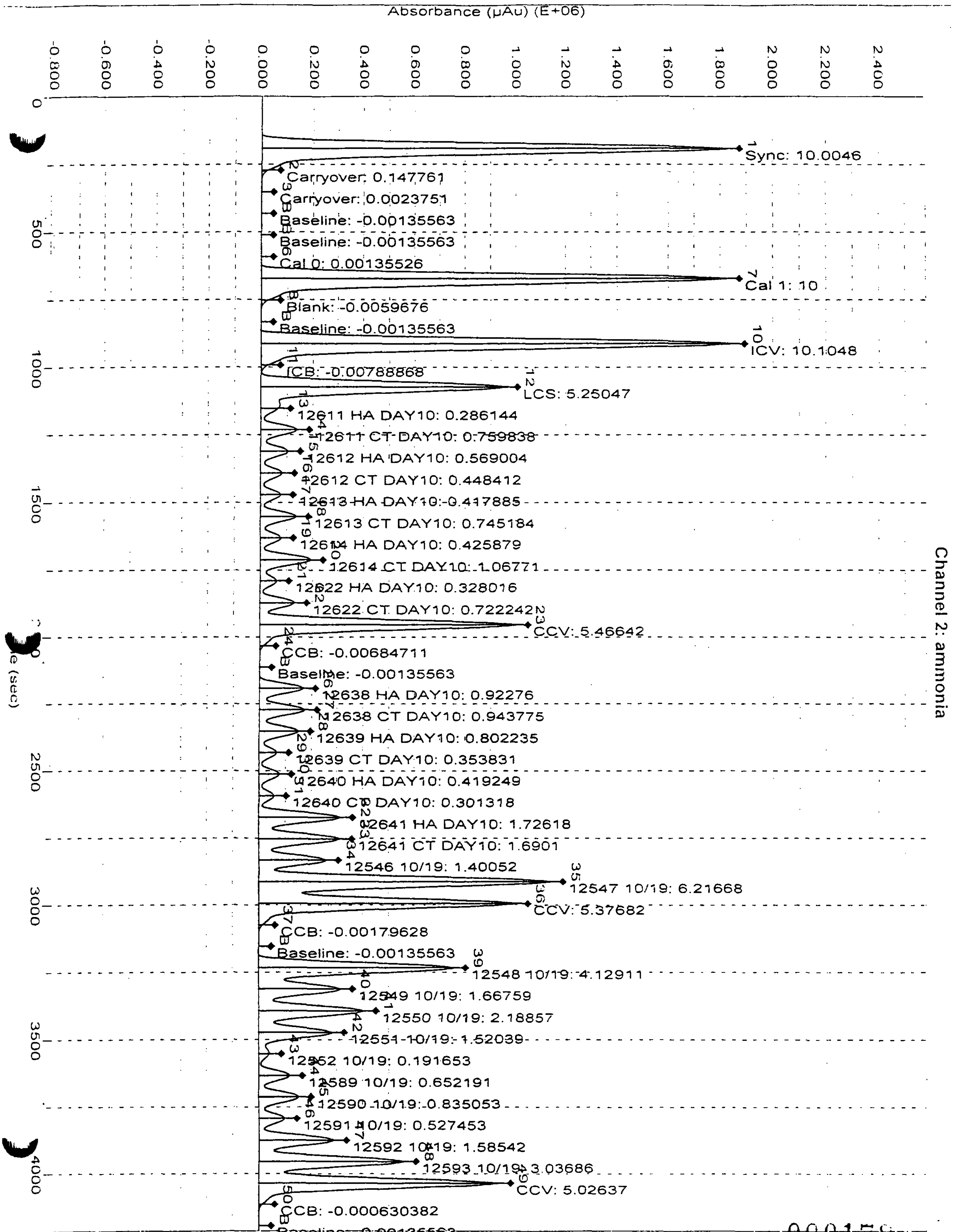
BTR Number: Several

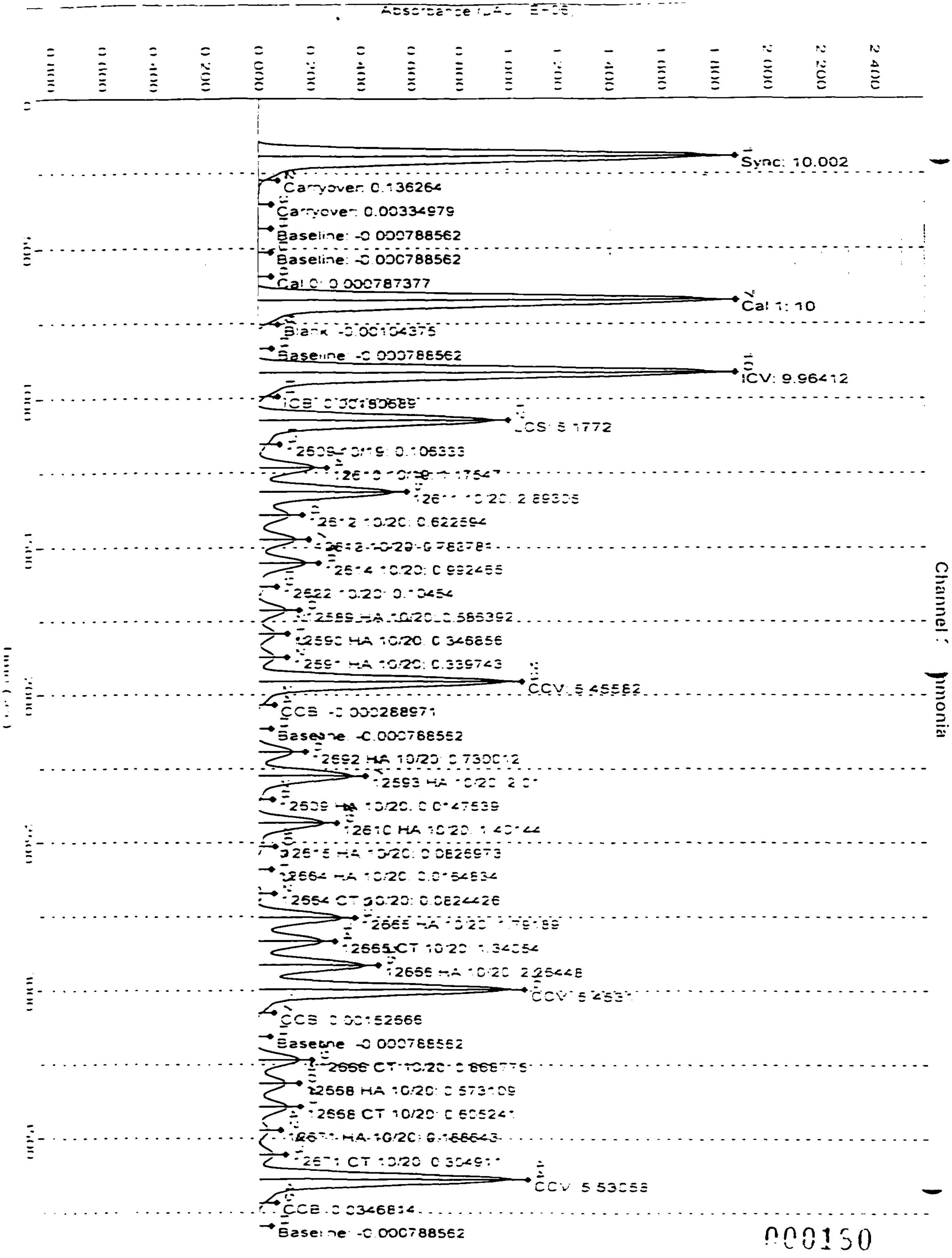
Sample Date	Sample Description	10N NaOH (ml)	50 ml Sample (ml)	Meter Reading NH_3-N (ppm)
	Calibration:			
	1 ppm	✓	✓	1.55
	5 ppm	✓	✓	5.52
	2 ppm EXT. STD.	✓	✓	1.92
	~~0.5 ppm~~			
	Blank (DI)	✓	✓	<0.5
11/29	12550 [BTOX-D-2]	✓	✓	<0.5
11/29	12551 [BTOX-D-3]	✓	✓	<0.5
11/29	12612 [BP-1 Borrow Pit	✓	✓	<0.5
11/29	12613 [BP-1 Borrow Pit (DUP)]	✓	✓	<0.5
	~~0.5~~ STD. check (0.5) JG	✓	✓	0.491
11/29	12668 [LAB QC-LCS]	✓	✓	<0.5
12/9	12548 [BTOX-C-3]	✓	✓	<0.5
12/13	12609 [E-1 Dead Creek]	✓	✓	<0.5
	0.5 STD. check	✓	✓	0.490
	Blank (DI)	✓	✓	<0.5

SLOPE = -58.4

Analyst: JG Analysis Date: 12/22/99

Reviewed by: J Date: 12/22/99


Absorbance (µAu) (E+06)
-0.800
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
2.200
2.400
0
500
1000
1500
2500
3000
3500
4000
Time (sec)
Channel 2: ammonia
Sync: 10.0046
Carryover: 0.147761
Carryover: 0.0023751
Baseline: -0.00135563
Baseline: -0.00135563
Cal 0: 0.00135526
Cal 1: 10
Blank: -0.0059676
Baseline: -0.00135563
ICV: 10.1048
ICB: -0.00788868
LCS: 5.25047
12611 HA DAY10: 0.286144
12611 CT DAY10: 0.759838
12612 HA DAY10: 0.569004
12612 CT DAY10: 0.448412
12613 HA DAY10: 0.417885
12613 CT DAY10: 0.745184
12614 HA DAY10: 0.425879
12614 CT DAY10: 1.06771
12622 HA DAY10: 0.328016
12622 CT DAY10: 0.722242
CCV: 5.46642
CCB: -0.00684711
Baseline: -0.00135563
12638 HA DAY10: 0.92276
12638 CT DAY10: 0.943775
12639 HA DAY10: 0.802235
12639 CT DAY10: 0.353831
12640 HA DAY10: 0.419249
12640 CT DAY10: 0.301318
12641 HA DAY10: 1.72618
12641 CT DAY10: 1.6901
12546 10/19: 1.40052
12547 10/19: 6.21668
CCV: 5.37682
CCB: -0.00179628
Baseline: -0.00135563
12548 10/19: 4.12911
12549 10/19: 1.66759
12550 10/19: 2.18857
12551 10/19: 1.52039
12552 10/19: 0.191653
12589 10/19: 0.652191
12590 10/19: 0.835053
12591 10/19: 0.527453
12592 10/19: 1.58542
12593 10/19: 3.03686
CCV: 5.02637
CCB: -0.000630382
Baseline: -0.00135563


Absorbance (AU) E-03
Sync: 10.002
Carryover: 0.136264
Carryover: 0.00334979
Baseline: -0.000788562
Baseline: -0.000788562
Cal 0: 0.000787377
Cal 1: 10
Blank: -0.00104375
Baseline: -0.000788562
ICV: 9.96412
ICB: 0.00160689
LCS: 5.1772
CCV: 5.45582
CCB: -0.000288971
Baseline: -0.000788552
CCV: 5.4531
CCB: 0.00152666
Baseline: -0.000788562
CCV: 5.53058
CCB: 0.0346834
Baseline: -0.000788562
Channel 1: Ammonia

000150

Peak Table: ammonia

File name: F:\FLOW_4\102799D.RST
Date: October ~~28~~, 1999 27
Operator: LKS

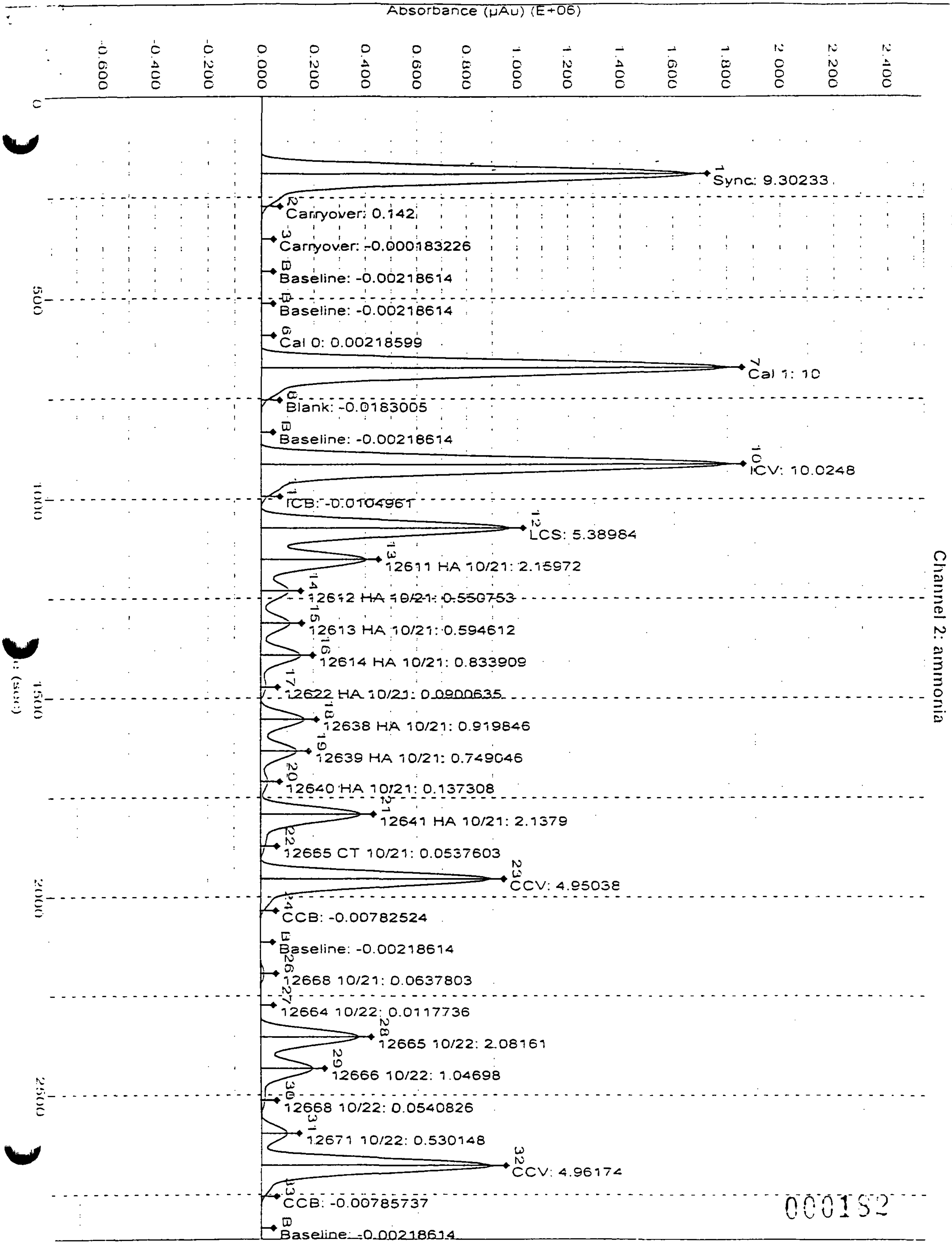
Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1828142	10.004595
2	0	Carryover	CO	1	1	27244	0.147761
3	0	Carryover	CO	1	1	682	0.002375
B	0	Baseline	RB	1	1	0	-0.001356
B	0	Baseline	RB	1	1	0	-0.001356
6	1	Cal 0	C	1	1	495	0.001355
7	2	Cal 1	C	1	1	1827302	10.000000
8	0	Blank	U	1	1	-843	-0.005968
B	0	Baseline	RB	1	1	0	-0.001356
10	2	ICV	U	1	1	1846458	10.104847
11	1	ICB	U	1	1	-1194	-0.007889
12	3	LCS	U	1	1	959538	5.250472
13	31	12611 HA DAY10	U	1	1	52528	0.286144
14	32	12611 CT DAY10	U	1	1	139074	0.759838
15	33	12612 HA DAY10	U	1	1	104208	0.569004
16	34	12612 CT DAY10	U	1	1	82175	0.448412
17	35	12613 HA DAY10	U	1	1	76598	0.417885
18	36	12613 CT DAY10	U	1	1	136397	0.745184
19	37	12614 HA DAY10	U	1	1	78058	0.425879
20	38	12614 CT DAY10	U	1	1	195324	1.067707
21	39	12622 HA DAY10	U	1	1	60178	0.328016
22	40	12622 CT DAY10	U	1	1	132205	0.722242
23	3	CCV	U	1	1	998992	5.466417
24	1	CCB	U	1	1	-1003	-0.006847
[illegible]	0	Baseline	RB	1	1	0	-0.001356
26	41	12638 HA DAY10	U	1	1	168841	0.922760
27	42	12638 CT DAY10	U	1	1	172681	0.943775
28	43	12639 HA DAY10	U	1	1	146820	0.802235
29	44	12639 CT DAY10	U	1	1	64895	0.353831
30	45	12640 HA DAY10	U	1	1	76847	0.419249
31	46	12640 CT DAY10	U	1	1	55300	0.301318
32	47	12641 HA DAY10	U	1	1	315631	1.726184
33	48	12641 CT DAY10	U	1	1	309039	1.690103
34	49	12546 10/19	U	1	1	256130	1.400515
35	50	12547 10/19	U	1	1	1136070	6.216682
36	3	CCV	U	1	1	982623	5.376822
37	1	CCB	U	1	1	-81	-0.001796
B	0	Baseline	RB	1	1	0	-0.001356
39	51	12548 10/19	U	1	1	754658	4.129107
40	52	12549 10/19	U	1	1	304925	1.667588
41	53	12550 10/19	U	1	1	400111	2.188566
42	54	12551 10/19	U	1	1	278030	1.520385
43	55	12552 10/19	U	1	1	35264	0.191653
44	56	12589 10/19	U	1	1	119406	0.652191
45	57	12590 10/19	U	1	1	152816	0.835053
46	58	12591 10/19	U	1	1	96616	0.527453
47	59	12592 10/19	U	1	1	289912	1.585416
48	60	12593 10/19	U	1	1	555099	3.036863
49	3	CCV	U	1	1	918593	5.026368
50	1	CCB	U	1	1	133	-0.000630
B	0	Baseline	RB	1	1	0	-0.001356

Peak Table: ammonia

File name: E:\FLOW_4\102799B.RST
Date: October 28, 1999
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1827617	10.001991
2	0	Carryover	CO	1	1	25041	0.136264
3	0	Carryover	CO	1	1	756	0.003350
B	0	Baseline	RB	1	1	0	-0.000789
B	0	Baseline	RB	1	1	0	-0.000789
6	1	Cal 0	C	1	1	288	0.000787
7	2	Cal 1	C	1	1	1827253	10.000001
8	1	Blank	U	1	1	-47	-0.001044
B	0	Baseline	RB	1	1	0	-0.000789
10	2	ICV	U	1	1	1820698	9.964125
11	1	ICB	U	1	1	474	0.001807
12	3	LCS	U	1	1	946075	5.177200
13	61	12609 10/19	U	1	1	19572	0.106333
14	62	12610 10/19	U	1	1	214916	1.175473
15	63	12611 10/20	U	1	1	528736	2.893049
16	64	12612 10/20	U	1	1	113899	0.622594
17	65	12613 10/20	U	1	1	143349	0.783781
18	66	12614 10/20	U	1	1	181478	0.992465
19	67	12622 10/20	U	1	1	19245	0.104540
20	68	12589 HA 10/20	U	1	1	107284	0.586392
21	69	12590 HA 10/20	U	1	1	63518	0.346856
22	70	12591 HA 10/20	U	1	1	62219	0.339743
23	3	CCV	U	1	1	996983	5.455823
24	1	CCB	U	1	1	91	-0.000289
B	0	Baseline	RB	1	1	0	-0.000789
26	71	5 12592 HA 10/20 ~~12592 HA 10/20~~	U	1	1	133525	0.730012
27	72	12593 HA 10/20	U	1	1	367392	2.009997
28	73	12609 HA 10/20	U	1	1	2840	0.014754
29	74	12610 HA 10/20	U	1	1	256203	1.401440
30	75	12615 HA 10/20	U	1	1	15234	0.082697
31	76	12664 HA 10/20	U	1	1	3186	0.016483
32	77	12664 CT 10/20	U	1	1	15207	0.082443
33	78	12665 HA 10/20	U	1	1	327542	1.791890
34	79	12665 CT 10/20	U	1	1	245075	1.340539
35	80	12666 HA 10/20	U	1	1	413889	2.264477
36	3	CCV	U	1	1	996484	5.453096
37	1	CCB	U	1	1	423	0.001527
B	0	Baseline	RB	1	1	0	-0.000789
39	81	12666 CT 10/20	U	1	1	158879	0.868775
40	82	12668 HA 10/20	U	1	1	104857	0.573109
41	83	12668 CT 10/20	U	1	1	110728	0.605241
42	84	12671 HA 10/20	U	1	1	34611	0.188643
43	85	12671 CT 10/20	U	1	1	55855	0.304911
44	3	CCV	U	1	1	1010641	5.530580
45	1	CCB	U	1	1	6481	0.034681
B	0	Baseline	RB	1	1	0	-0.000789

Peak	Cup	Flags
1	2	
2	0	
3	0	



Absorbance (µAu) (E+06)
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
2.200
2.400
0
500
1000
1500
2000
2500
Channel 2: ammonia
1 Sync: 9.30233
2 Carryover: 0.142
3 Carryover: -0.000183226
B Baseline: -0.00218614
B Baseline: -0.00218614
6 Cal 0: 0.00218599
7 Cal 1: 10
8 Blank: -0.0183005
B Baseline: -0.00218614
10 ICV: 10.0248
11 ICB: -0.0104961
12 LCS: 5.38984
13 12611 HA 10/21: 2.15972
14 12612 HA 10/21: 0.550753
15 12613 HA 10/21: 0.594612
16 12614 HA 10/21: 0.833909
17 12622 HA 10/21: 0.0900635
18 12638 HA 10/21: 0.919846
19 12639 HA 10/21: 0.749046
20 12640 HA 10/21: 0.137308
21 12641 HA 10/21: 2.1379
22 12665 CT 10/21: 0.0537603
23 CCV: 4.95038
24 CCB: -0.00782524
B Baseline: -0.00218614
26 12668 10/21: 0.0637803
27 12664 10/22: 0.0117736
28 12665 10/22: 2.08161
29 12666 10/22: 1.04698
30 12668 10/22: 0.0540826
31 12671 10/22: 0.530148
32 CCV: 4.96174
33 CCB: -0.00785737
B Baseline: -0.00218614

000182

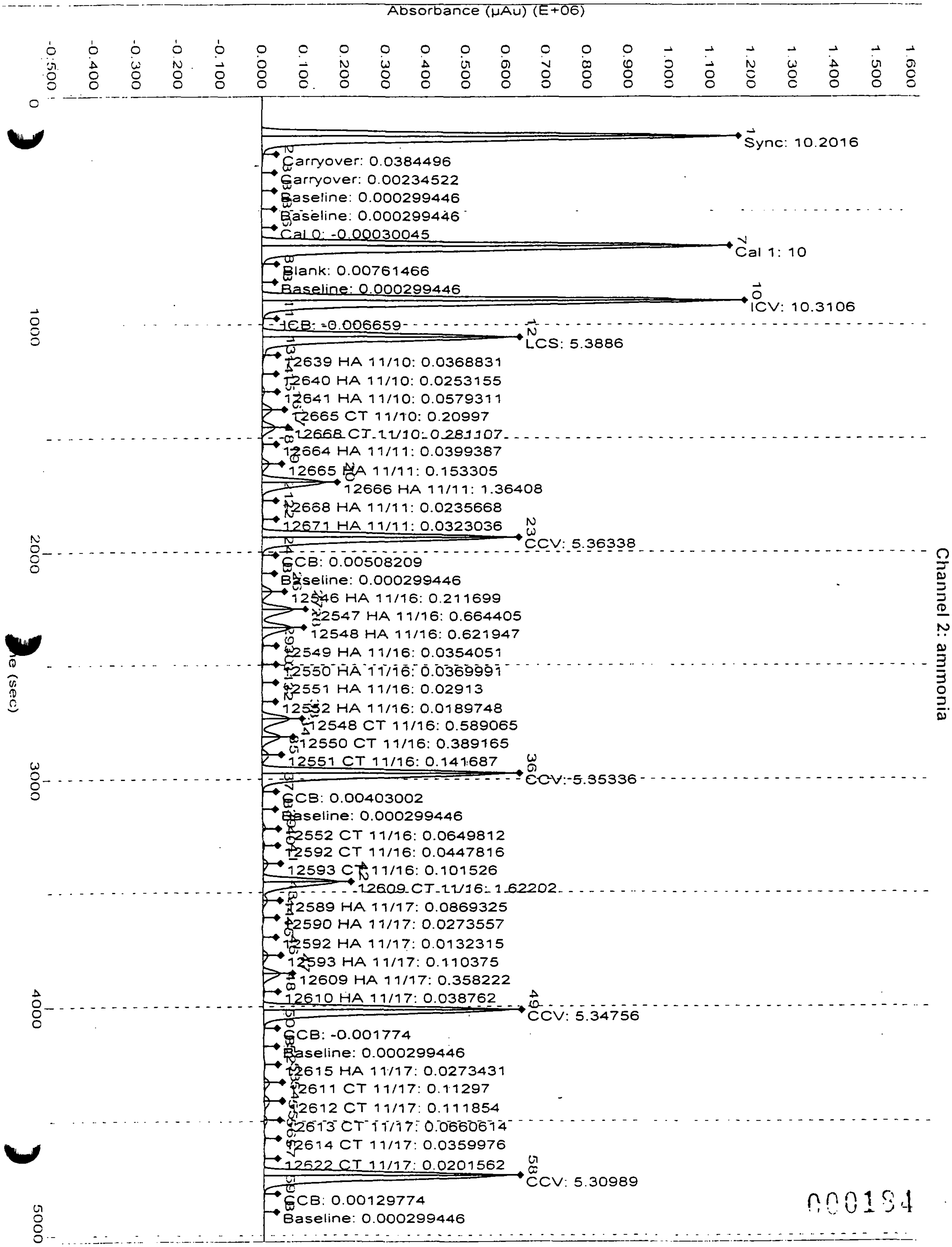
Peak Table: ammonia

File name: F:\FLOW_4\102799F.RST
Date October 28, 1999
Operator: NTW

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1683774	9.302330
2	0	Carryover	CO	1	1	26092	0.142000
3	0	Carryover	CO	1	1	362	-0.000183
B	0	Baseline	RB	1	1	0	-0.002186
B	0	Baseline	RB	1	1	0	-0.002186
6	1	Cal 0	C	1	1	791	0.002186
7	2	Cal 1	C	1	1	1810026	10.000000
8	0	Blank	U	1	1	-2916	-0.018301
B	0	Baseline	RB	1	1	0	-0.002186
10	2	ICV	U	1	1	1814510	10.024775
11	1	ICB	U	1	1	-1804	-0.010496
12	3	LCS	U	1	1	975757	5.389835
13	91	12611 HA 10/21	U	1	1	391225	2.159720
14	92	12612 HA 10/21	U	1	1	100062	0.550753
15	93	12613 HA 10/21	U	1	1	107398	0.594612
16	94	12614 HA 10/21	U	1	1	151312	0.833909
17	95	12622 HA 10/21	U	1	1	16694	0.090064
18	96	12638 HA 10/21	U	1	1	166654	0.919846
19	97	12639 HA 10/21	U	1	1	135345	0.749046
20	98	12640 HA 10/21	U	1	1	25243	0.137308
21	99	12641 HA 10/21	U	1	1	387207	2.137903
22	100	12665 CT 10/21	U	1	1	10124	0.053760
23	3	CCV	U	1	1	896232	4.950380
24	1	CCB	U	1	1	-1020	-0.007825
B	0	Baseline	RB	1	1	0	-0.002186
26	101	12663 10/21	U	1	1	11937	0.063780
27	102	12664 10/22	U	1	1	2526	0.011774
28	103	12665 10/22	U	1	1	377190	2.081606
29	104	12666 10/22	U	1	1	189960	1.046979
30	105	12668 10/22	U	1	1	11183	0.054083
31	106	12671 10/22	U	1	1	96333	0.530148
32	3	CCV	U	1	1	898288	4.961744
33	1	CCB	U	1	1	-1026	-0.007857
B	0	Baseline	RB	1	1	0	-0.002186

Peak	Cup	Flags
1	2	
2	0	
3	0	LO
B	0	BL
B	0	BL
6	1	
7	2	
8	0	LO
B	0	BL
10	2	
11	1	LO
12	3	
13	91	
14	92	
15	93	

000193


Absorbance (µAu) (E+06)
-0.500
-0.400
-0.300
-0.200
-0.100
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500
1.600
Time (sec)
0
1000
2000
3000
4000
5000
Channel 2: ammonia
Sync: 10.2016
Carryover: 0.0384496
Carryover: 0.00234522
Baseline: 0.000299446
Baseline: 0.000299446
Cal 0: -0.00030045
Cal 1: 10
Blank: 0.00761466
Baseline: 0.000299446
ICV: 10.3106
ICB: -0.006659
LCS: 5.3886
12639 HA 11/10: 0.0368831
12640 HA 11/10: 0.0253155
12641 HA 11/10: 0.0579311
12665 CT 11/10: 0.20997
12668 CT 11/10: 0.281107
12664 HA 11/11: 0.0399387
12665 HA 11/11: 0.153305
12666 HA 11/11: 1.36408
12668 HA 11/11: 0.0235668
12671 HA 11/11: 0.0323036
CCV: 5.36338
CCB: 0.00508209
Baseline: 0.000299446
12546 HA 11/16: 0.211699
12547 HA 11/16: 0.664405
12548 HA 11/16: 0.621947
12549 HA 11/16: 0.0354051
12550 HA 11/16: 0.0369991
12551 HA 11/16: 0.02913
12552 HA 11/16: 0.0189748
12548 CT 11/16: 0.589065
12550 CT 11/16: 0.389165
12551 CT 11/16: 0.141687
CCV: 5.35336
CCB: 0.00403002
Baseline: 0.000299446
12552 CT 11/16: 0.0649812
12592 CT 11/16: 0.0447816
12593 CT 11/16: 0.101526
12609 CT 11/16: 1.62202
12589 HA 11/17: 0.0869325
12590 HA 11/17: 0.0273557
12592 HA 11/17: 0.0132315
12593 HA 11/17: 0.110375
12609 HA 11/17: 0.358222
12610 HA 11/17: 0.038762
CCV: 5.34756
CCB: -0.001774
Baseline: 0.000299446
12615 HA 11/17: 0.0273431
12611 CT 11/17: 0.11297
12612 CT 11/17: 0.111854
12613 CT 11/17: 0.0660614
12614 CT 11/17: 0.0359976
12622 CT 11/17: 0.0201562
CCV: 5.30989
CCB: 0.00129774
Baseline: 0.000299446

000184

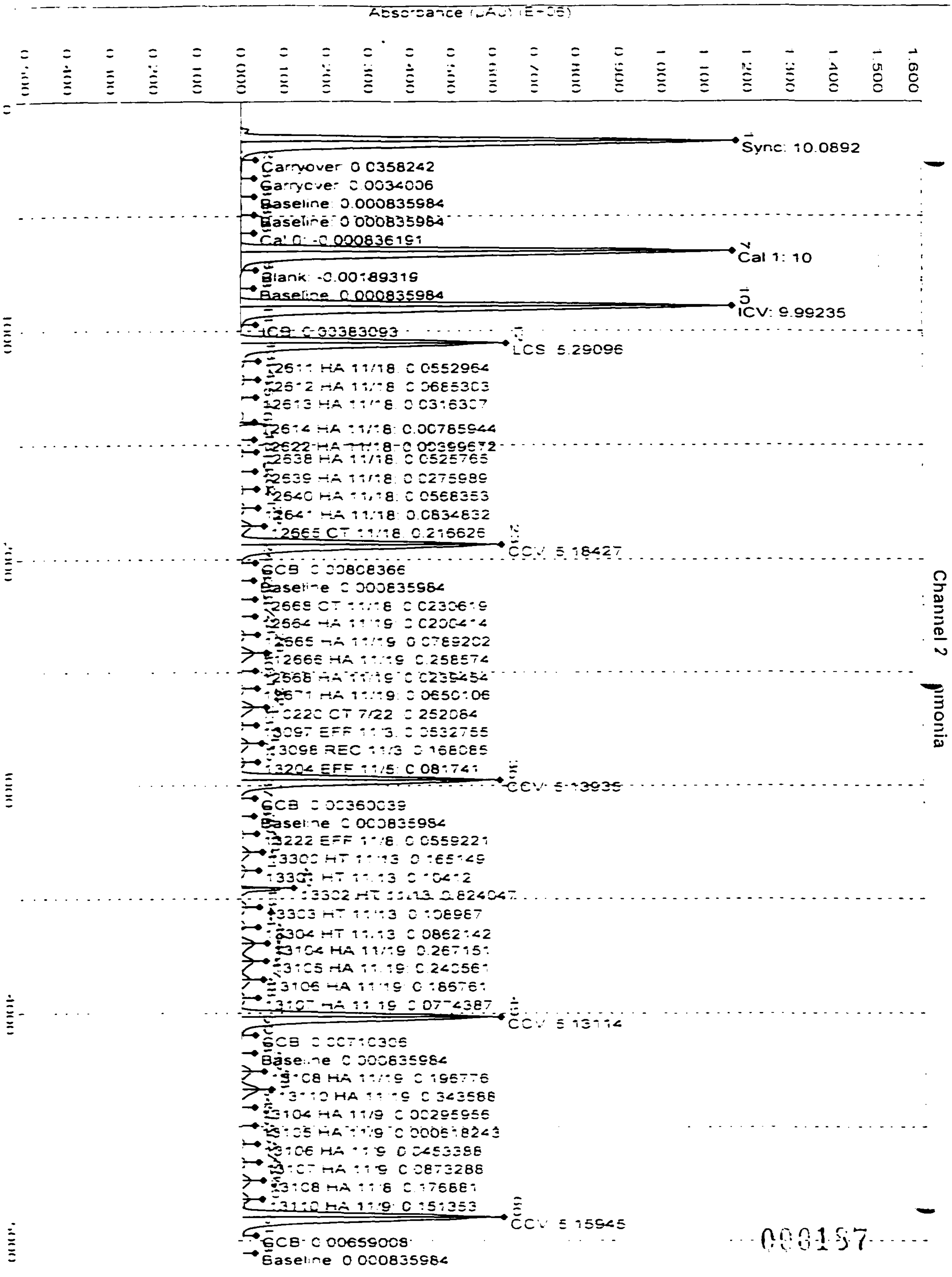
Peak Table: ammonia

File name: F: FLOW_4 1123990.RST
Date: November 23, 1999
Operator: mvw

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1139012	10.201578
2	0	Carryover	CO	1	1	4260	0.038450
3	0	Carryover	CO	1	1	228	0.002345
B	0	Baseline	RB	1	1	0	0.000299
B	0	Baseline	RB	1	1	0	0.000299
6	1	Cal 0	C	1	1	-67	-0.000300
7	2	Cal 1	C	1	1	1116505	10.000001
8	1	Blank	U	1	1	817	0.007615
B	0	Baseline	RB	1	1	0	0.000299
10	2	ICV	U	1	1	1151190	10.310650
11	1	ICB	U	1	1	-777	-0.006659
12	3	LCS	U	1	1	601625	5.388603
13	31	12639 HA 11/10	U	1	1	4085	0.036883
14	32	12640 HA 11/10	U	1	1	2793	0.025316
15	33	12641 HA 11/10	U	1	1	6435	0.057931
16	34	12665 CT 11/11	U	1	1	23411	0.209970
17	35	12668 CT 11/10	U	1	1	31353	0.281107
18	36	12664 HA 11/11	U	1	1	4426	0.039939
19	37	12665 HA 11/11	U	1	1	17084	0.153305
20	38	12666 HA 11/11	U	1	1	152272	1.364084
21	39	12668 HA 11/11	U	1	1	2598	0.023567
22	40	12671 HA 11/11	U	1	1	3573	0.032304
23	3	CCV	U	1	1	598809	5.363383
24	1	CCB	U	1	1	534	0.005082
B	0	Baseline	RB	1	1	0	0.000299
26	41	12546 HA 11/16	U	1	1	23604	0.211699
27	42	12547 HA 11/16	U	1	1	74150	0.664405
28	43	12548 HA 11/16	U	1	1	69409	0.621947
29	44	12549 HA 11/16	U	1	1	3920	0.035405
30	45	12550 HA 11/16	U	1	1	4098	0.036999
31	46	12551 HA 11/16	U	1	1	3219	0.029130
32	47	12552 HA 11/16	U	1	1	2085	0.018975
33	48	12548 CT 11/16	U	1	1	65738	0.589065
34	49	12550 CT 11/16	U	1	1	43418	0.389165
35	50	12551 CT 11/16	U	1	1	15786	0.141687
36	3	CCV	U	1	1	597690	5.353364
37	1	CCB	U	1	1	417	0.004030
B	0	Baseline	RB	1	1	0	0.000299
39	51	12552 CT 11/16	U	1	1	7222	0.064981
40	52	12592 CT 11/16	U	1	1	4967	0.044782
41	53	12593 CT 11/16	U	1	1	11302	0.101526
42	54	12609 CT 11/16	U	1	1	181072	1.622023
43	55	12589 HA 11/17	U	1	1	9673	0.086932
44	56	12590 HA 11/17	U	1	1	3021	0.027356
45	57	12592 HA 11/17	U	1	1	1444	0.013232
46	58	12593 HA 11/17	U	1	1	12290	0.110375
47	59	12609 HA 11/17	U	1	1	39963	0.358222
48	60	12610 HA 11/17	U	1	1	4294	0.038762
49	3	CCV	U	1	1	597042	5.347564
50	1	CCB	U	1	1	-232	-0.001774
B	0	Baseline	RB	1	1	0	0.000299
52	61	12615 HA 11/17	U	1	1	3020	0.027343
53	62	12611 CT 11/17	U	1	1	12580	0.112970
54	63	12612 CT 11/17	U	1	1	12456	0.111854

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
55	64	12613 CT 11/17	U	1	1	7343	0.066061
56	65	12614 CT 11/17	U	1	1	3986	0.035998
57	66	12622 CT 11/17	U	1	1	2217	0.020156
[illegible]	3	CCV	U	1	1	592836	5.309892
[illegible]	1	CCB	U	1	1	111	0.001298
B	0	Baseline	RB	1	1	0	0.000299

Peak	Cup	Flags
1	2	
2	0	
3	0	
B	0	BL
B	0	BL
6	1	LO
7	2	
8	0	
B	0	BL
10	2	
11	1	LO
12	3	
13	31	
14	32	
15	33	
16	34	
17	35	
18	36	
[illegible]	37	
20	38	
21	39	
22	40	
23	3	
24	1	
B	0	BL
26	41	
27	42	
28	43	
29	44	
30	45	
31	46	
32	47	
33	48	
34	49	
35	50	
36	3	
37	1	
B	0	BL
39	51	
40	52	
41	53	
42	54	
43	55	
44	56	
45	57	
46	58	
47	59	
48	60	



Absorbance (μAU) (E-06)
1.200
1.300
1.400
1.500
1.600
Sync: 10.0892
Carryover 0.0358242
Carryover 0.0034006
Baseline 0.000835984
Baseline 0.000835984
Cal 0: -0.000836191
Cal 1: 10
Blank: -0.00189319
Baseline 0.000835984
ICV: 9.99235
LCS 5.29096
12611 HA 11/18 0.0552964
12612 HA 11/18 0.0685303
12613 HA 11/18 0.0316307
12614 HA 11/18 0.00785944
12622 HA 11/18 0.00399672
12638 HA 11/18 0.0525765
12639 HA 11/18 0.0275989
12640 HA 11/18 0.0568353
12641 HA 11/18 0.0834832
12665 CT 11/18 0.216626
CCV 5.18427
CCB 0.00808366
Baseline 0.000835984
12669 CT 11/18 0.230619
12664 HA 11/19 0.200414
12665 HA 11/19 0.0789202
12666 HA 11/19 0.258574
12668 HA 11/19 0.0239454
12671 HA 11/19 0.0650106
10220 CT 7/22 0.252084
13097 EFF 11/3 0.0532755
13098 REC 11/3 0.168085
13204 EFF 11/5 0.081741
CCV 5.13935
CCB 0.00360039
Baseline 0.000835984
13222 EFF 11/8 0.0559221
13300 HT 11/13 0.165149
13301 HT 11/13 0.10412
13302 HT 11/13 0.824047
13303 HT 11/13 0.108987
13304 HT 11/13 0.0862142
13104 HA 11/19 0.267151
13105 HA 11/19 0.240561
13106 HA 11/19 0.186761
13107 HA 11/19 0.0774387
CCV 5.13114
CCB 0.00710306
Baseline 0.000835984
13108 HA 11/19 0.196776
13110 HA 11/19 0.343588
13104 HA 11/9 0.00295956
13105 HA 11/9 0.000618243
13106 HA 11/9 0.0453388
13107 HA 11/9 0.0873288
13108 HA 11/8 0.176881
13110 HA 11/9 0.151353
CCV 5.15945
CCB 0.00659008
Baseline 0.000835984
Channel 2
monia

Peak Table: ammonia

File name: F:\FLOW_4\112399E.RST
Date: November 23, 1999
Operator: nvw

k	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1143680	10.089201
2	0	Carryover	CO	1	1	3966	0.035824
3	0	Carryover	CO	1	1	291	0.003401
B	0	Baseline	RB	1	1	0	0.000836
B	0	Baseline	RB	1	1	0	0.000836
6	1	Cal 0	C	1	1	-190	-0.000836
7	2	Cal 1	C	1	1	1133567	10.000000
8	0	Blank	U	1	1	-309	-0.001893
B	0	Baseline	RB	1	1	0	0.000836
10	2	ICV	U	1	1	1132700	9.992354
11	1	ICB	U	1	1	340	0.003831
12	3	LCS	U	1	1	599722	5.290965
13	91	12611 HA 11/18	U	1	1	6174	0.055296
14	92	12612 HA 11/18	U	1	1	7674	0.068530
15	93	12613 HA 11/18	U	1	1	3491	0.031631
16	94	12614 HA 11/18	U	1	1	796	0.007859
17	95	12622 HA 11/18	U	1	1	358	0.003997
18	96	12638 HA 11/18	U	1	1	5866	0.052576
19	97	12639 HA 11/18	U	1	1	3034	0.027599
20	98	12640 HA 11/18	U	1	1	6348	0.056835
21	99	12641 HA 11/18	U	1	1	9369	0.083483
22	100	12665 CT 11/18	U	1	1	24463	0.216626
23	3	CCV	U	1	1	587626	5.184266
	1	CCB	U	1	1	822	0.008084
	0	Baseline	RB	1	1	0	0.000836
26	101	12668 CT 11/18	U	1	1	2520	0.023062
27	102	12664 HA 11/19	U	1	1	2177	0.020041
28	103	12665 HA 11/19	U	1	1	8852	0.078920
29	104	12666 HA 11/19	U	1	1	29219	0.258574
30	105	12668 HA 11/19	U	1	1	2620	0.023945
31	106	12671 HA 11/19	U	1	1	7275	0.065011
32	107	10220 CT 7/22	U	1	1	28483	0.252084
33	108	13097 EFF 11/3	U	1	1	5945	0.053275
34	109	13098 REC 11/3	U	1	1	18960	0.168085
35	110	13204 EFF 11/5	U	1	1	9172	0.081741
36	3	CCV	U	1	1	582533	5.139346
37	1	CCB	U	1	1	313	0.003600
B	0	Baseline	RB	1	1	0	0.000836
39	111	13222 EFF 11/8	U	1	1	6245	0.055922
40	112	13300 HT 11/13	U	1	1	18628	0.165149
41	113	13301 HT 11/13	U	1	1	11709	0.104120
42	114	13302 HT 11/13	U	1	1	93324	0.824047
43	115	13303 HT 11/13	U	1	1	12261	0.108987
44	116	13304 HT 11/13	U	1	1	9679	0.086214
45	117	13104 HA 11/19	U	1	1	30191	0.267151
46	118	13105 HA 11/19	U	1	1	27177	0.240561
47	119	13106 HA 11/19	U	1	1	21078	0.186761
48	120	13107 HA 11/19	U	1	1	8684	0.077439
49	3	CCV	U	1	1	581603	5.131139
	1	CCB	U	1	1	710	0.007103
	0	Baseline	RB	1	1	0	0.000836
52	80	13108 HA 11/19	U	1	1	22213	0.196776
53	81	13110 HA 11/19	U	1	1	38856	0.343588
54	82	13104 HA 11/9	U	1	1	241	0.002960

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
55	83	13105 HA 11/9	U	1	1	-25	0.000618
56	84	13106 HA 11/9	U	1	1	5045	0.045339
57	85	13107 HA 11/9	U	1	1	9805	0.087329
58	86	13108 HA 11/9	U	1	1	19958	0.176881
59	87	13110 HA 11/9	U	1	1	17064	0.151353
60	3	CCV	U	1	1	584812	5.159447
61	1	CCB	U	1	1	652	0.006590
B	0	Baseline	RB	1	1	0	0.000836

Peak	Cup	Flags
1	2	
2	1	
3	1	
B	0	BL
B	0	BL
6	1	LO
7	2	
8	1	LO
B	0	BL
10	2	
11	1	
12	3	
13	91	
14	92	
15	93	
16	94	CM
17	95	
18	96	
19	97	
20	98	
21	99	
22	100	
23	3	
24	1	
B	0	BL
26	101	
27	102	
28	103	
29	104	
30	105	
31	106	
32	107	
33	108	
34	109	
35	110	
36	3	
37	1	
B	0	BL
39	111	
40	112	
41	113	
42	114	
43	115	
44	116	
45	117	
46	118	

Results of Ammonia Analyses (Total, mg/L) *Hyalella azteca* / Dead Creek / Project 99033			
Sample ID	Porewater	Day 0 Overlying Water	Day 10 Overlying Water (1.)
12546	6.3	1.4	<0.5
12547	23.1	6.2	2.5
12548	17.3	4.1	0.5
12549	7.4	1.7	0.6
12550	9.3	2.2	0.9
12551	5.9	1.5	0.9
12552	-	<0.5	<0.5
12589	2.9	0.7	0.7
12590	4.4	0.8	<0.5
12591	2.1	0.5	<0.5
12592	5.7	1.6	0.7
12593	13.3	3.0	0.5
12609	2.2	<0.5	<0.5
12610	7.1	1.2	<0.5
12611	12.9	2.2	<0.5
12612	2.4	0.6	<0.5
12613	2.7	0.6	0.7
12614	3.5	0.8	<0.5
12622	-	<0.5	<0.5
12638	4.0	0.9	0.5
12639	1.6	0.7	0.8
12640	0.6	<0.5	<0.5
12641	6.4	2.1	1.1
12664	<0.5	<0.5	<0.5
12665	10.3	3.4	1.8
12666	6.7	2.2	2.3
12668	-	<0.5	0.6
12671	2.4	0.7	<0.5

(1.) Data pertain to acute toxicity tests only J 12/8/99

J

10/12/99

#	ABS Sample ID		NWW <0.5	JWW <0.5
1.	2^ed^ 10589	0	Y	Y
2.	590	0		
3.	591	0		
4.	592	0		
5.	593	0		
6.	10609	0		
7.	10610	0		
8.	10615	0		
9	10[illegible]	0		
10	612	0		
11.	613	0		
12.	614	0		
13	12632	0		
14	12638	0		
15	12639	0		
16	12640	0		
17	126[illegible]	0		
18	12546	W		
19	547	W		
20	548	W		

[illegible]

10/12/99

000131

#	ABS Sample ID		NVW <0.5 ppm	JWW <0.5
1	12664	PW	Y	Y
2	RHB 65	PW		
3	12671	PW		
4	10546	0		
5	10547	0		
6	10548	0		
7	10549	0		
8	550	0		
9	10551	0		
10	552	0		
11	12664	0		
12	665	0		
13	666	0		
14	668	0		
15	671	0	v	

NVW 10/12/99

10/12/99

	1...	2...
	<0.5 ppms =	<0.5 ppms =
1. 12549 FW	✓	✓
2. 550 FW		
3. R 551 FW		
4. 12569 FW		
5. 590 FW		
6. 591 FW		
7. 592 FW		
8. 593 FW		
9. 12609 FW		
10. 12610 FW		
11. 611 FW		
12. 612 FW		
13. 613 FW		
14. 614 FW		
15. 12638 FW		
16. 639 FW		
17. 640 FW		
18. 641 FW		
19. 12666 FW ✓		
20. * 12666 FW N		

*5.0 ppm MS

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3615

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/6/99 & 10/18/99; ALL SAMPLES (retest) ~~JG for LS~~ TM
- *C. tentans* acute test: 10/6/99
- *H. azteca* chronic test: 10/18/99; ALL SAMPLES JG for LS
- *C. tentans* chronic test: 12548, 12550, 12551; 10/18/99 JG for LS

10/28/99 – Loaded sediments for aux males (12548, 12550, 12551, 12552, 12592, 12593, 12609) JW

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12546	6.9			Viscous mud, NO overlying water
12547	7.0			Liquid, fine mud, many freshwater gastropods.
				removed visible gastropods 10/6 TM
12548	7.0			Liquid mud, gastropods present, removed those visible 10/6 TM
12549	7.0			Soft mud. pine needles, some overlying water
12550	7.0			soft mud with overlying water pine needles
12551	7.0			soft mud with overlying water
12552 LCS	TM 10/6/99			EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% $CaCO_3$). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: TM Date: 10/6/99

000124

Reviewer: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Sediment Characterization

Client: Menzie-Cura & Assoc. Project: 99033	BTR: 3622 / 3629

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/7/99 & 10/18/99 JG TM (Hyalella retest)
- *C. tentans* acute test: 10/7/99
- *H. azteca* chronic test:
- *C. tentans* chronic test: 10/18/99 ; 12592, 12593, 12609 TM

*Sample 12592 sieved to remove indigenous chironimids (for C.T. only)

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12589	7.1			dk brown muddy sediment with sticks and vegetative material
12590	6.9			dk brown cohesive mud with veg. material
12591	6.9			brown mud with veg. material
* 12592	7.1			dk. brown mud with little veg. material
12593	7.0			black watery mud w/petroleum-like odor
12609	7.1			thick dk. brown cohesive mud with veg. material
12610	7.2			dk brown, very thick cohesive mud w/some veg. material
12615 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay, 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JG Date 10/7/99

000195

Reviewer: [signature] Date 12/10/99

Laboratory: Aquatec Biological Sciences South Burlington Vermont

hasurvwl.

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3629 / 3633

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/8/99
- *C. tentans* acute test: 10/8/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12611	6.8			black mud w/leaf litter
12612	7.7			Fine Brown mud
12613	7.7			Soft Brown mud
12614	7.5			Soft Brown mud
12638	7.6			Soft Brown mud
12639	7.3			sticks + leaves on top + through out cohesive mud, dark
12640	7.2			sticks + leaf litter Dark thick mud
12641	7.2			Soft Brown mud
12622 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JJG Date: 10/8/99

000136

Reviewer: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Sediment Characterization

Client: Menzie-Cura & Assoc. Project: 99033 | BTR: 3641

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/9/99
- *C. tentans* acute test: 10/9/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12664	7.8			fine cohesive mud.
12665	7.3			fine soft mud
12666	7.5			fine. sticky/cohesive mud
~~12667~~ SG 12671	7.4			fine, brown mud - chironomids present
12668 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: [illegible] Date: 10/9/99

000197

Reviewer [illegible] Date 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Preparation of Formulated Control Sediment
for
Freshwater Sediment Toxicity Tests

Procedure based on EPA/600/R-94/024

Batch No. 10/4 Preparation Date: 10/4/99 Prepared by: JJG

Ingredient	Amount (g)	Percent composition
Fine sand	1848	
Medium sand	924	77
Kaolinite clay	612	17
Blended and 0.~~3~~ 50 mm sieved Canadian sphagnum peat	180	5
CaCO3	36	1
Total	3600	100

Store well-mixed and dry in a sealed Rubbermaid box. Label by batch number. Store copy of this documentation in project file. Store original in Sed/Water preparation notebook.

Hydrate to a cohesive sediment consistency before use.

000198

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 17, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets? TWICE	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring DAILY							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓		✓	✓	✓	✓
• feeding completed?	✓	✓ (1)	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	[illegible]	10/18	10/19	10/20	10/21	[illegible]	10/23

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:	[illegible] on Day -1 (day
	prior to organism [illegible] [illegible]

Exposure water for H.a. [illegible]
= Lake / Recon mix
Exposure water for C.T. [illegible]
= Recon Water.
[illegible] 10/21

Reviewer [illegible] Date 12/9/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000199

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 31, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	—	—	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JG 10/31	11/1 JG	11/2 TM	11/3 TM	TM	JG 11/5	JG 11/6

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments: 11/5/99 (midnight) renewal missed. Renewal initiated at 09:30
"Noon" renewal conducted at 14:00 11/6 JG 11/6/99 JJG

Reviewer [signature] Date 12/9/99
seddelfw.doc
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of November 7, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	—	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	TM 11/7	JG 11/8	TM 11/9	JG TM 11/10	TM 11/11	JG 11/12	JG 11/13

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer: _______ Date 12/9/99

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of November 14, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	✓	✓	—	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	TM JG 11/14/99	JG JM 11/15/99	TM 11/16/99	JG 11/17	TM 11/18	TM JG 11/19	JG 11/20

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

000202

Reviewer [signature] Date 12/9/99
seddelfw.doc
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of November 21, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	At 11:00 pm	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JM 11/21	JG 11/22	JG 11/23	JM 11/24	JM 11/25	JG 11/26	JG 11/27

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer: [signature] Date 12/9/99

seddelfw.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000203

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of November 28, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

Test monitoring

• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓

Additional activities

Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

Corrective Action / Comments							
Initials/Date	TM 11/28/99	JB 11/29 TM	TM 11/30	TM 12/1	TM 12/2	JG 12/3	JG 12/4

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer J Date 12/9/99 000204

seddelfw.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of December 5, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	* Sample [illegible]	✓	✓	(4) ✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	Skipped JG	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JG 12/5/99	JG TM 12/6	JG TM 12/7	TM 12/8	TM 12/9	JG 12/10	JG 12/11

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include it in the test data package.

Comments
* Sample [illegible] received on extra reservoir. 12/5 JG 1030
(4) Same [illegible] [illegible] on extra reservoir 12/8 TM

000205

Reviewer: [signature] Date 12/22/99

sedoefa.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of December 12, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓						
Noon delivery cycle							
• splitter boxes filling?	✓						
• syringes filling?	✓						
• needles flowing?	✓						
• beaker screens clear, flowing?	✓						
• drainage to waste ok?	✓						
• empty waste buckets?	✓						
Test monitoring							
• test temperature ok?	✓						
• D.O. ok?	—						
• check for floating organisms	✓						
• feeding completed?	Skipped						
Additional activities							
Prior to midnight fill reservoirs (1L)	✓						
Check sediment water supply	✓						
Corrective Action / Comments							
Initials/Date	TM 12/12						

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer ______ Date 12/22/99
seddelfw.doc
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

SEDIMENT TEST MANUAL RENEWAL

DAILY SCHEDULE: MORNING (0700 – 0800) AND EVENING (1800-1900)

October, 1999

Day of Month	AM Renewal Time	Initials	PM Renewal Time	Initials
1				
2				
3				
4				
5				
6				
7				
8				
9			2230	J
10	09:00	JJG	17:00 18:45 JG	TM
11	09:00	JJG	19:00	LS
12	07:15	J	17:00	JJG
13	07:00	TM	1830	J
14	07:00	TM	1830	LS
15	07:40	JJG	1815	LS
16	07:20	LS	18:30	JJG
17	07:30	JJG	—	—
18	07:30	TM	—	—
19	—	—	—	—
20	07:30	JJG	—	—
21	~~07:30~~	~~LS~~	~~17:00~~ 18:00	TM
22	07:20	LS	19:00	TM
23	07:30	JJG	18:00	LS
24	07:30	JJG	19:00	TM
25	07:00	TM	1900	J
26	07:00	TM	~~07:00~~ 19:00	JG
27	07:00	TM	~~07:00~~ 19:00	JG
28	07:00	TM	~~07:00~~ 19:00	TM
29	07:00	TM	19:00	JG
30	07:15	LS	18:30	JG
31	07:20	TM	19:00	JG

J 12/22/99

000207

SEDIMENT TEST MANUAL RENEWAL

DAILY SCHEDULE: MORNING (0700 – 0800) AND EVENING (1800-1900)

November, 1999

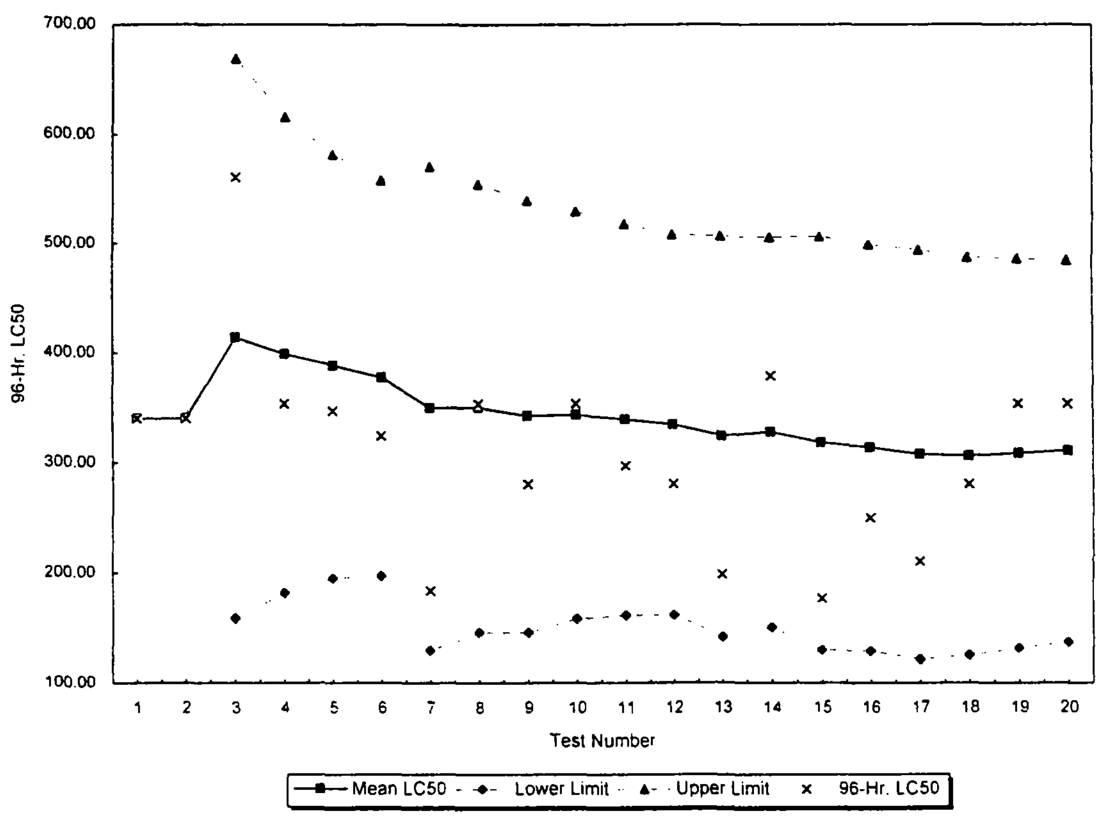
Day of Month	AM Renewal Time	Initials	PM Renewal Time	Initials
1	07:30	JG	19:00	TM
2	07:15	TM	18:45	JG
3	07:10	J	18:45	TM
4	07:25	J	19:00	TM
5	07:25	J	18:30	JG
6	08:30	JG	18:00	[illegible]
7	08:00	TM	18:30	JG
8	08:00	JG	19:30	TM
9	07:00	TM	19:00	JG
10	07:00	TM	18:30	J
11	07:00	TM	1900	J
12	08:00	J	19:00	JG
13	07:00	JS	19:00	JG
14	07:00	TM	19:15	JG
15	08:00	JG	19:00	TM
16	07:00	TM	19:00	JG
17	07:30	JG	19:00	TM
18	07:00	TM	18:30	LS
19	07:00	JM		
20				
21			19:15 system check	J
22			19:00 system check	TM
23	07:00	JM system check	18:00	JG
24	07:00	JM system check	1900	TM
25	07:00	TM	1915	J
26	07:00	JG for Cd	1955	J
27	09:30	JG system check		
28	08:30	TM system check	18:00	JG
29	08:30	JG system check	18:30	~~TM~~ JG
30	07:30	TM system check	18:00	JG
31				

ON 11/19/99 All sediment tests were placed w/in automated renewal system w/ renewals at 12:00 & 24:00 daily

J 12/22/99

Reference Toxicant Control Chart
Hyalella azteca
in Potassium chloride (mg/L)

Test Number	Test Date	Organism Age (Days)	96-Hr. LC50	Mean LC50	Lower Limit	Upper Limit	Organism Source
1	04/15/98	8	340.198	340.20			Env. Consult & Testing
2	04/17/98	10	340.198	340.20	340.20	340.20	Env. Consult & Testing
3	08/04/98	14	561.231	413.88	158.65	669.10	Env. Consult & Testing
4	08/22/98	10	353.553	398.80	181.85	615.74	Env. Consult & Testing
5	09/13/98	11	347.163	388.47	194.99	581.94	Env. Consult & Testing
6	10/26/98	12	324.210	377.76	196.93	558.59	Env. Consult & Testing
7	11/13/98	10	183.717	350.04	129.21	570.87	Env. Consult & Testing
8	02/19/99	9	353.553	350.48	146.02	554.94	Env. Consult & Testing
9	05/13/99	8	280.616	342.72	145.87	539.56	Env. Consult & Testing
10	06/21/99	12	353.553	343.80	158.09	529.51	Env. Consult & Testing
11	06/25/99	14	297.302	339.57	161.17	517.97	Env. Consult & Testing
12	06/26/99	10	280.616	334.66	161.19	508.13	Env. Consult & Testing
13	07/02/99	7	198.425	324.18	141.71	506.65	Env. Consult & Testing
14	07/07/99	8	378.929	328.09	150.35	505.83	Env. Consult & Testing
15	07/07/99	7	176.777	318.00	129.75	506.26	Aquatic Research Organisms
16	09/13/99	11	250.000	313.75	128.73	498.77	Aquatic Research Organisms
17	10/08/99	9	210.224	307.66	121.61	493.71	Aquatic Research Organisms
18	10/23/99	13	280.616	306.16	125.21	487.11	Aquatic Research Organisms
19	10/23/99	9	353.553	308.65	131.47	485.84	Aquatic Research Organisms
20	11/09/99	12	353.553	310.90	137.27	484.53	Aquatic Research Organisms



Summary of Sauget 1999 *Hyalella azteca* statistical analysis 3/21-23/01

Additional statistical analyses were performed. When a sample mean response value was equal to or greater than the corresponding reference site value, the result was assumed to be not significant, without statistical analysis. * Indicates a statistically significant reduction was detected ($P \leq 0.05$).

1. The data for reference sites Prairie Dupont (Sample 12664, PD) and Prairie Dupont 2 (Sample 12665, PD2) were compared against each other:

<u>Results of Reference Site Comparisons</u>

Day 28 survival:	Not significant
Day 28 growth:	* Reference 12664 (PD) < Reference 12665 (PD2)
Day 35 survival:	Not significant
Day 42 survival:	Not significant
Day 42 reproduction:	* Reference 12664 (PD) < Reference 12665 (PD2)
Day 42 growth:	* Reference 12664 (PD) < Reference 12665 (PD2)

2. The data for reference sites Prairie Dupont (Sample 12664, PD) and Prairie Dupont 2 (Sample 12665, PD2) were combined and then the sample data for samples 12612 (BP1); 12613 (BP1FD); 12614 (BP3); and 12368 (BP2) were compared to the combined reference site data:

<u>Results of Multiple Sample Comparisons vs. Combined Reference Sites</u>

Day 28 survival:	Not significant for all samples
Day 28 growth:	Not significant for all samples
Day 35 survival:	Not significant for all samples
Day 42 survival:	Not significant for all samples
Day 42 reproduction:	Not significant for all samples
Day 42 growth:	Not significant for all samples

3. The data for individual reference sites Prairie Dupont (Sample 12664, PD) and Prairie Dupont 2 (Sample 12665, PD2) were compared directly with the sample data for each individual sample for samples 12612 (BP1); 12613 (BP1FD); 12614 (BP3); and 12638 (BP2). The results of the statistical analysis were:

<u>Results of Single Sample Comparisons vs. Individual Reference Sites</u>:

Day 28 survival:	
12638 (BP2) vs. 12664 (PD):	Not significant
12638 (BP2) vs. 12665 (PD2):	Not significant
Day 28 growth:	
12612 (BP1) vs. 12665 (PD2):	Not significant
12613 (BP1FD) vs. 12665 (PD2):	Not significant
12614 (BP3) vs. 12665 (PD2):	* (BP3 < PD2)
12638 (BP2) vs. 12665 (PD2):	Not significant

Day 35 survival:

12613 (BP1FD) vs. 12664 (PD):	Not significant
12613 (BP1FD) vs. 12665 (PD2):	Not significant
12638 (BP2) vs. 12664 (PD):	Not significant
12638 (BP2) vs. 12665 (PD2):	Not significant

Day 42 survival:

12613 (BP1FD) vs. 12664 (PD):	Not significant
12613 (BP1FD) vs. 12665 (PD2):	Not significant
12638 (BP2) vs. 12664 (PD):	Not significant
12638 (BP2) vs. 12665 (PD2):	Not significant

Day 42 growth:

12612 (BP1) vs. 12665 (PD2):	* BP1 < PD2
12613 (BP1FD) vs. 12665 (PD2):	Not significant
12614 (BP3) vs. 12664 (PD):	Not significant
12614 (BP3) vs. 12665 (PD2):	* BP3 < PD2
12638 (BP2) vs. 12665 (PD2):	Not significant

Day 42 reproduction:

12612 (BP1) vs. 12665 (PD2):	* BP1 < PD2
12613 (BP1FD) vs. 12665 (PD2):	Not significant
12614 (BP3) vs. 12665 (PD2):	Not significant
12638 (BP2) vs. 12665 (PD2):	Not significant

Summary of Statistical Analyses

1. When the reference site data were compared to each other, Sample 12664 (Prairie Dupont) was shown to have significantly lower Day 28 growth, Day 42 reproduction, and Day 42 growth than Sample 12665 (Prairie Dupont 2).
2. When the reference site data were combined and the test sample data were compared to the combined reference site data (with multiple comparison tests), no significant reductions in survival, growth, or reproduction were detected for any of the test samples.
3. When individual sample data were compared to individual reference site data, the following significant reductions were detected:
   a. Sample 12614 (BP3) had lower Day 28 survival than Reference 12665 (PD2);
   b. Sample 12612 (BP1) had lower Day 42 growth than Reference 12655 (PD2);
   c. Sample 12614 (BP3) had lower Day 42 growth than Reference 12655 (PD2);
   d. Sample 12612 (BP1) had lower Day 42 reproduction than Reference 12665 (PD2).

Results of *Chironomus tentans* Survival and Growth Sediment Toxicity Tests Conducted on Sediment Samples from Dead Creek / Sauget, Illinois

Reference BTRs 3615, 3622, 3629, 3633, 3641, 3643

Prepared for:
Menzie-Cura & Associates
1 Courthouse Lane, Suite 2
Chelmsford, MA 01824

Prepared by:
Aquatec Biological Sciences
75 Green Mountain Drive
South Burlington, Vermont

December 1999

A

Aquatec Biological Sciences

Ecology | Environmental Toxicology | Natural Resource Assessments | Microbiology

BTRs 3615, 3622, 3629, 3633, 3641, 3643

PROJECT: 99033

I have reviewed this data package, which was completed under my supervision. This data package is complete, and to the best of my ability, accurately reflects the conditions and the results of the reported tests.

John W. Williams — 12/14/99 Date
Toxicity Laboratory Manager

I have reviewed and discussed this data package with the responsible laboratory manager. Based on this review, the data package was, to the best of my knowledge and belief, conducted in accordance with established company quality assurance procedures.

Philip C. Downey, Ph.D. — 12/14/99 Date
Director

75 Green Mountain Drive, South Burlington, Vt 05403 Tel: 802.860.1638 Fax: 802.658.3189

TABLE OF CONTENTS

LIST OF APPENDICES

EXECUTIVE SUMMARY

100.2CT Midge, *Chironomus tentans* 10-day Survival and Growth Test
Conducted October 7 - October 20, 1999
for Menzie-Cura & Associates
Dead Creek Site

Laboratory Sample ID	Client Sample ID	Mean Survival (%)	Mean Dry Weight (mg)
12546	BTOX-C-1	30 *	--
12547	BTOX-C-2	0 *	--
12548	BTOX-C-3	96	2.352
12549	BTOX-D-1	44 *	--
12550	BTOX-D-2	48 *	--
12551	BTOX-D-3	71 *	--
12552	Laboratory Control Sediment	98	2.558
12589	BTOX-B-1	0 *	--
12590	BTOX-B-1 (DUPE)	4 *	--
12591	BTOX-B-2	0 *	--
12592	BTOX-B-3	100 [1]	0.581[1]
12593	BTOX-M	96 *	--
12609	E-1 Dead Creek	91*	--
12610	E-2 Dead Creek	16 *	--
12615	Laboratory Control Sediment	100	1.922
12611	E-3 Dead Creek	97	2.240
12612	BP-1 Borrow Pit	64 *	--
12613	BP-1 Borrow Pit (DUPE)	40 *	--
12614	BP-3 Borrow Pit	53 *	--
12622	Laboratory Control Sediment	94	1.761
12638	BP-2 Borrow Pit	14 *	--
12639	F-1 Dead Creek Section F	31 *	--
12640	F-2 Dead Creek Section F	16 *	--
12641	F-3 Dead Creek Section F	10 *	--
12664	Prairie DuPont Creek	16 *	--
12665	Prairie DuPont Creek 2	55 *	--
12666	Reference Creek	13 *	--
12668	Laboratory Control Sediment	100	2.065
12671	Ref 2-2 Reference Borrow Pit	11 *	--

* The response data were statistically significantly different from the corresponding laboratory control sediment ($p \leq 0.05$)

-- When a statistically significant reduction in survival was detected, mean dry weight data were only reported in Appendix A (See Results)

[1] Indigenous *Chironomus tentans* were present in this sample, resulting in counts higer than the initial number. Statistical analysis of test data for Sample 12592 was not performed.

INTRODUCTION:

Samples were received for toxicity testing at Aquatec Biological Sciences of 75 Green Mountain Drive, South Burlington, Vermont. Tests were conducted at Aquatec Biological Sciences. The results of the following tests are reported:

Client:	Menzie-Cura & Associates
Facility/Location:	Dead Creek / Sauget, IL
Initial Sampling Date:	October 4 - October 9, 1999
Testing Date:	October 7 - October 20 , 1999
Tests Conducted:	Midge, *Chironomus tentans*, 10-day Survival and Growth

METHODS:

Toxicity Tests

The procedures followed in conducting these toxicity tests were based on methods described by the USEPA (EPA 600/R-94/024). Specific test parameters for the *Chironomus tentans* whole sediment toxicity test are listed in Table 1. Testing was completed in four separate groupings based upon chronological sequencing from the time of sediment collection. The objective for the test groupings was to complete the 10-day acute tests prior to expiration of a 14-day sediment storage time so that subsequent chronic toxicity tests could be started within a 14-day time frame. The first testing group was initiated on October 7, 1999. The second testing group was initiated on October 8, 1999. The third testing group was initiated on October 9, 1999. The fourth testing group was initiated on October 10, 1999. A laboratory control (artificial sediment) was included with each testing group.

Sediment Preparation

The samples were stored refrigerated and in the dark whenever they were not being used in preparation for testing. Sediments distributed in test beakers were examined for the presence of indigenous organisms which were removed when observed. Also, large pieces of vegetative material (e.g., leaf litter, sticks, grass) were removed. Qualitative observations regarding the sediment type and indigenous organisms removed were recorded. A laboratory control sediment was used with each Sample Delivery Group. The laboratory control sediment (artificial sediment) was prepared following formulations specified in the USEPA protocols and then hydrated prior to distribution to test chambers. Sediments were then distributed to individual replicate test chambers, overlying water was added, and the overlying water renewal system was activated. The unused portion of each sample (in the original sample container) was returned to refrigerated storage.

Statistical Analysis

Statistical comparisons were performed against the concurrent laboratory control. The growth measurement was based upon the average dry weight of surviving midge larvae per replicate, following the USEPA protocol for the test method. Statistical significance for any sample is based upon the most sensitive endpoint (survival or growth). An F-Test was performed to test for equality of variances between each sample comparison to the control. If variances were not significantly different, paired T-Tests with equal variances were used to determine whether there were significant reductions in mean survival (Arcsin transformed) and/or mean growth in each sample relative to the control. If the variance between a sample and control comparison was significantly different, paired T-Tests with unequal variances were used to determine significant reductions in mean survival and/or growth.

PROTOCOL DEVIATIONS:

Surviving midge larvae in three test replicates (12640D, 12668A, and 12668B) were not included in the dry weight statistical analysis due to an apparent laboratory error.

Sample 12592 (BTOX-B-3) had greater than ten larvae recovered on Day 10 in seven of the eight test replicates. Several of the replicates had very high numbers (e.g., 18-28 larvae) recovered. Many of excess larvae were very small and appeared to be *Chironomus tentans*. This particular sample had an indigenous population of the test species which contributed to the final count because the test population and the indigenous population could not be easily differentiated. Statistical analysis of this sample (comparison to the Laboratory Control

Sample) was not performed due to the confounding presence of indigenous midge larvae. It was assumed that acute toxicity was not characteristic of this sample. This sediment sample was seived through a 0.3 mm mesh sieve prior to initiating subsequent chronic toxicity testing.

The following test replicates (12593C, 12615H, 12638G, and 12639A) had eleven larvae surviving when the test was ended. Proportion surviving was scored as 1.0 for these replicates.

The following replicates had slight inconsistencies in the number surviving larvae versus the number weighed: Replicate 12593F had nine surviving larvae and eight larvae weighed; Replicatee 12593G had 10 surviving larvae and nine larvae weighed; Replicate 12666 had three surviving larvae and one larvae weighed.

Large predacious indigenous organisms (dragonfly nymphs and a leech) were found in some test replicates on Day 10. These replicates had no surviving midge larvae, possibly due to predation. The affected test replicates included 12547B, 12547F, 12551E, 12611G, and 12640F. These replicates were excluded from the statistical data analysis.

RESULTS:

Summary result tabulations for the *Chironomus tentans* whole sediment toxicity tests are located in Appendix A.

Group 1 Test Results: This group included Samples 12546 (BTOX-C-1), 12547, (BTOX-C-2), 12548 (BTOX-C-3), 12549 (BTOX-D-1), 12550 (BTOX-D-2), and 12551 (BTOX-D-3). Samples 12546 (BTOX-C-1), 12547, (BTOX-C-2), 12549 (BTOX-D-1), 12550 (BTOX-D-2), and 12551 (BTOX-D-3) had survival responses that were significantly less than the Laboratory Control Sample (12552) which had 98 percent survival. Survival and growth responses for Sample 12548 (BTOX-C-3) were not significantly less than the Laboratory Control Sample. Samples 12546, 12547, and 12549 exhibited acute toxicity and were not scheduled for chronic toxicity testing. Samples 12548, 12550, and 12551 were scheduled for chronic toxicity testing.

Group 2 Test Results: This group included Samples 12589 (BTOX -B-1), 12590 (BTOX-B-1 duplicate), 12591 (BTOX-B-2), 12592 (BTOX-B-3), 12593 (BTOX-M), 12609 (E-1 Dead Creek), and 12610 (E-2 Dead Creek). Survival responses for samples 12589 (BTOX -B-1), 12590 (BTOX-B-1 duplicate), 12591 (BTOX-B-2), 12593 (BTOX-M), 12609 (E-1 Dead Creek), and 12610 (E-2 Dead Creek) were significantly less than the Laboratory Control Sample (12615). The Laboratory Control Sample for this testing group had 100 percent survival, hence no statistical variability in the survival response data. This lack of statistical variability may have had the effect of increasing the sensitivity of the statistical analysis such that samples with high survival (Samples 12593 and 12609 had 96 percent and 91 percent survival, respectively.) were shown to be significantly lower than the Laboratory Control Sample response. Samples 12589, 12590, 12591, and 12610 exhibited acute toxicity and were not scheduled for chronic toxicity testing. Samples 12592, 12593, and 12609 were scheduled for chronic toxicity testing.

Sample 12592 (BTOX-B-3) had indigenous *Chironomus tentans* larvae present in the sediment which confounded the final Day 10 survival counts. Statistical analysis of acute data for this sample was not performed.

Group 3 Test Results: This group included samples 12611 (E-3 Dead Creek), 12612, (BP-1 Borrow Pit), 12613 (BP-1 Borrow Pit duplicate), 12614 (BP-3 Borrow Pit), 12638 (BP-2 Borrow Pit), 12639 (F-1 Dead Creek Section F), 12640 (F-2 Dead Creek Section F), and 12641 (F-3 Dead Creek Section F). Survival responses for samples 12612, 12613, 12614, 12638, 12639, 12640, and 12641 were significantly less than the Laboratory Control sample (12622) which had 94 percent survival. The responses observed for Sample 12611 were not significantly less than the Laboratory Control. Samples 12638, 12639, 12640, and 12641 exhibited acute toxicity and were not scheduled for chronic toxicity testing. Samples 12611, 12612, 12613, and 12614 were scheduled for chronic toxicity testing.

Group 4 Test Results: This goup included samples 12664 (Prairie Du Pont Creek), 12665 (Prairie Du Pont Creek 2), 12666 (Reference Creek), and 12671 (Ref 2-2 Borrow Pit). Survival responses for all four samples were significantly less than the Laboratory Control sample

(12668) which had 100 percent survival. Only sample 12666 exhibited a growth responses that was significantly less than the Laboratory Control. Sample 12665 was scheduled for chronic toxicity testing. Samples 12664, 12666, and 12671 exhibited acute toxicity (defined as <50% survival and/or statistically lower than the control) and were not scheduled for chronic toxicity testing.

Total Ammonia and Sulfide: Total ammonia concentrations were less than 25mg/L in porewater and less than 7 mg/L in overlying water. Total sulfide was not detected (<0.5mg/L) in any porewater samples, therefore, testing for sulfide in overlying water was not conducted.

QUALITY ASSURANCE:

A standard reference toxicant SRT test was conducted for each batch *Chironomus tentans* used in testing. The resulting LC50 values fell within control chart limits and were viewed as being acceptable.

Table 1. Test Conditions for the Midge *(Chironomus tentans)* 10-day Whole Sediment Survival and Growth Toxicity Test.

ASSOCIATED PROTOCOL: EPA. 1994. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates Method 100.1* (EPA/600/R-94/024).

1. Test type:	Whole-sediment toxicity (static renewal)
2. Temperature:	23 $\pm$ 1 °C
3. Light quality:	Wide-spectrum fluorescent lights
4. Light illuminance:	500 to 1000 lux
5. Photoperiod:	16 hr. light. 8 hr. dark
6. Test chamber size:	300 mL beaker
7. Sediment volume:	100 mL (distributed to test chambers on the day prior to administration of test organisms)
8. Overlying water volume:	175 mL
9. Renewal of overlying water:	Twice daily
10. Age of test organism:	3rd instar or younger
11. Number of organisms/test chamber:	10
12. Number of replicate test chambers / treatment:	8
13. Feeding regime:	1.5 mL Tetrafin suspension daily (1.5 mL contains 4.0 mg of dry solids)
14. Aeration:	None unless dissolved oxygen in overlying water drops below 40 % saturation or demonstrates a declining trend during daily monitoring. If required, aeration will be sufficiently gentle to prevent resuspension of sediments to the overlying water. Additional water renewals may be used in lieu of aeration.

Table 1. Test Conditions for the Midge *(Chironomus tentans)* 10-day Whole Sediment Survival and Growth Toxicity Test (continued).

15. Overlying water:	Reconstituted water (EPA/600/R-94/024)
16. Control sediment:	Formulated sediment (EPA/600/R-94/024, Section 7.2.3.2)
17. Test chamber cleaning:	None
18. Monitoring:	
Overlying water	
Temperature	Daily
Dissolved oxygen	Daily
pH	Beginning and end of test
Conductivity	Beginning and end of test
Alkalinity	Beginning and end of test
Hardness	Beginning and end of test
Ammonia	Beginning and end of test
Organism behavior	Within 2 hours to remove "floaters" Daily
19. Test duration:	10 days.
20. End points:	Survival and growth (dry weight of larvae to 0.01 mg, 60°C overnight), by replicate
21. Reference toxicant:	96-h acute, water only (KCl)
22. Test acceptability:	Minimum mean control survival of 70% and performance-based criteria outlined in EPA/600/R-94/024, Table 12.3
23. Statistical analysis and data interpretation:	Arc-sine (square-root) transformation of survival data. F-Tests were performed for equality of variance. Paired T-Tests were performed versus the negative control for survival and growth.

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Acute Toxicity Test
BTR: 3615

Day 10		Survival				Growth			
		Proportion Surviving	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant	Average Weight (mg)	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant
12552	Control	0.98				2.558			
12546	Sample	0.30	0.042	0.000	*	2.905	0.000	0.316	
12547	Sample	0.00	NA[2]	0.000	*	0.000	NA[2]	NA[2]	*
12548	Sample	0.96	0.757	0.318		2.352	0.051	0.179	
12549	Sample	0.44	0.025	0.000	*	3.021	0.000	0.213	
12550	Sample	0.48	0.012	0.000	*	2.879	0.392	0.026	
12551	Sample	0.71	0.125	0.000	*	3.412	0.033	0.004	

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$).

1. If the F-Test result was significant (relative to the Laboratory Control, $P<0.05$), the T-Test was performed using unequal variances.
2. There were not enough sample and/or control response variablility to conduct a meaningful F-Test

Chironomus tentans Acute Toxicity Test Results — Menzie-Cura, Dead Creek, 99033 — BTR 3615, Aquatec Biological Sciences

			Day 10 Data							
Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12552	A	10	10	1.00		38.40	60.60	10	2.220	
	B	10	10	1.00		32.07	61.15	10	2.908	
	C	10	8	0.80		28.90	49.39	8	2.561	
	D	10	10	1.00		37.56	61.28	10	2.372	
	E	10	10	1.00		29.48	53.70	10	2.422	
	F	10	10	1.00		29.16	54.08	10	2.492	
	G	10	10	1.00		35.09	58.20	9	2.568	
	H	10	10	1.00	0.98	37.77	67.00	10	2.923	2.558
12546	A	10	4	0.40		36.85	53.60	4	4.188	
	B	10	2	0.20		40.08	47.98	2	3.950	
	C	12	2	0.17		35.91	46.39	2	5.240	
	D	10	0	0.00				0	0.000	
	E	10	6	0.60		31.81	51.42	6	3.268	
	F	10	5	0.50		36.63	49.64	5	2.602	
	G	10	1	0.10				0	0.000	
	H	10	4	0.40	0.30	30.27	42.24	3	3.990	2.905
12547	A	10	0	0.00				0	0.000	
	B	10	*					*		
	C	10	0	0.00				0	0.000	
	D	10	0	0.00				0	0.000	
	E	10	0	0.00				0	0.000	
	F	10	*					*		
	G	10	0	0.00				0	0.000	
	H	10	0	0.00	0.00			0	0.000	0.000
12548	A	10	10	1.00		30.00	56.51	10	2.651	
	B	10	10	1.00		27.30	49.64	10	2.234	
	C	10	10	1.00		29.43	58.90	10	2.947	
	D	10	*					*		
	E	10	8	0.80		28.53	45.64	8	2.139	
	F	10	9	0.90		28.93	51.70	9	2.530	
	G	10	10	1.00		29.98	42.54	10	1.256	
	H	10	10	1.00	0.96	32.29	59.33	10	2.704	2.352
12549	A	10	5	0.50		32.45	49.59	4	4.285	
	B	10	5	0.50		33.73	55.07	5	4.268	
	C	10	0	0.00				0	0.000	
	D	10	8	0.80		32.59	57.67	8	3.135	
	E	10	4	0.40		37.68	52.76	4	3.770	
	F	10	4	0.40		34.21	47.00	3	4.263	
	G	10	3	0.30		32.60	41.17	3	2.857	
	H	10	6	0.60	0.44	33.91	43.43	6	1.587	3.021
12550	A	10	1	0.10		32.87	35.62	1	2.750	
	B	10	2	0.20		31.55	36.98	2	2.715	
	C	10	9	0.90		29.56	54.14	9	2.731	
	D	10	4	0.40		39.14	48.55	4	2.353	
	F	10	4	0.40		33.26	43.44	3	3.393	
	G	10	6	0.60		27.47	44.63	6	2.860	
	H	10	8	0.80	0.48	25.50	52.40	8	3.363	2.879
12551	A	10	7	0.70		32.27	52.89	7	2.946	
	B	10	4	0.40		34.14	50.83	4	4.173	
	C	10	6	0.60		34.26	59.68	6	4.237	
	D	10	9	0.90		34.46	62.72	9	3.140	
	E	10	*					*		
	F	10	8	0.80		32.67	58.07	8	3.175	
	G	10	7	0.70		33.13	54.47	6	3.557	
	H	10	9	0.90	0.71	38.67	62.57	9	2.656	3.412

* A indigenous predator was found in the sample during breakdown on day 10. See protocol deviations.

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Acute Toxicity Test
BTR: 3622/3629

Day 10		Survival: Proportion Surviving	Survival: F-Test Equal Variance	Survival: T-Test Statistical Probability	Survival: Statistically Significant	Growth: Average Weight (mg)	Growth: F-Test Equal Variance[1]	Growth: T-Test Statistical Probability	Growth: Statistically Significant
12615	Control	1.00				1.922			
12589	Sample	0.00	NA[2]	0.000	*	0.000	NA[2]	0.000	*
12590	Sample	0.04	NA[2]	0.000	*	0.529	0.006	0.003	*
12591	Sample	0.00	NA[2]	0.000	*	0.000	NA[2]	0.000	*
12593	Sample	0.96	NA[2]	0.030	*	1.964	0.447	0.384	
12609	Sample	0.91	NA[2]	0.004	*	1.079	0.373	0.000	*
12610	Sample	0.16	NA[2]	0.000	*	1.501	0.000	0.293	

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$).
1. If the F-Test result was significant (relative to the Laboratory Control, $P<0.05$), the T-Test was performed using unequal variances.
2. There were not enough sample and/or control response variablility to conduct a meaningful F-Test.
Sample 12592 was not included in the statistical analysis. See protocol deviations.

Chironomus tentans
Acute Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3622/3629
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
			Day 10 Data							
12515	A	10	10	1.00		26.81	46.78	10	1.997	
	B	10	10	1.00		31.95	53.69	10	2.174	
	C	10	10	1.00		33.29	51.53	10	1.824	
	D	10	10	1.00		27.77	41.70	10	1.393	
	E	10	10	1.00		27.97	52.01	10	2.404	
	F	10	10	1.00		34.55	53.20	10	1.865	
	G	11	11	1.00		27.97	45.71	11	1.613	
	H	10	10	1.00	1.00	29.90	50.95	10	2.105	1.922
12589	A	10	0	0.00				0	0.000	
	B	10	0	0.00				0	0.000	
	C	10	0	0.00				0	0.000	
	D	10	0	0.00				0	0.000	
	E	10	0	0.00				0	0.000	
	F	10	0	0.00				0	0.000	
	G	10	0	0.00				0	0.000	
	H	10	0	0.00	0.00			0	0.000	0.000
12590	A	10	1	0.10		38.84	40.32	1	1.480	
	B	10	0	0.00				0	0.000	
	C	10	0	0.00				0	0.000	
	D	10	0	0.00				0	0.000	
	E	10	0	0.00				0	0.000	
	F	10	0	0.00				0	0.000	
	G	10	0	0.00				0	0.000	
	H	10	2	0.20	0.04	29.69	35.20	2	2.755	0.529
12591	A	10	0	0.00				0	0.000	
	B	10	0	0.00				0	0.000	
	C	10	0	0.00				0	0.000	
	D	10	0	0.00				0	0.000	
	E	10	0	0.00				0	0.000	
	F	10	0	0.00				0	0.000	
	G	10	0	0.00				0	0.000	
	H	10	0	0.00	0.00			0	0.000	0.000
12592	A	10	13	1.30		36.37	48.11	13	0.903	
	B	10	28	2.80		30.32	45.92	28	0.557	
	C	10	18	1.80		32.71	37.38	18	0.259	
	D	10	11	1.10		39.20	48.63	11	0.857	
	E	10	18	1.80		42.72	45.55	18	0.157	
	F	10	15	1.50		34.39	52.14	15	1.183	
	G	10	11	1.10		38.29	41.62	11	0.303	
	H	10	8	0.80	1.53	35.96	39.40	8	0.430	0.581
12593	A	10	9	0.90		33.78	51.62	9	1.982	
	B	10	9	0.90		43.18	60.67	9	1.943	
	C	11	11	1.00		36.03	57.58	11	1.959	
	D	10	10	1.00		35.15	50.58	10	1.543	
	E	10	10	1.00		40.43	60.22	10	1.979	
	F	10	9	0.90		35.65	50.59	9	1.641	
	G	10	10	1.00		35.15	56.60	9	2.404	
	H	10	10	1.00	0.9625	38.52	57.14	10	2.062	1.964
12609	A	10	8	0.80		31.55	39.77	8	1.028	
	B	10	10	1.00		31.99	42.69	10	1.070	
	C	10	10	1.00		32.11	41.76	10	0.965	
	D	10	8	0.80		32.66	39.06	8	0.800	
	E	10	10	1.00		38.79	53.66	10	1.487	
	F	10	9	0.90		31.57	39.93	9	1.040	
	G	10	9	0.90		27.38	35.53	9	0.906	
	H	10	9	0.90	0.91	26.07	38.09	9	1.336	1.079
12610	A	10	2	0.20		32.27	41.92	2	4.825	
	B	10	0	0.00				0	0.000	
	C	10	0	0.00				0	0.000	
	D	10	1	0.10		34.50	39.01	1	4.510	
	E	10	0	0.00				0	0.000	
	F	10	1	0.10		34.19	34.92	1	0.730	
	G	10	0	0.00				0	0.000	
	H	10	9	0.90	0.16	32.34	49.85	9	1.946	1.501

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Acute Toxicity Test
BTR: 3629/3633

Day 10		Survival: Proportion Surviving	Survival: F-Test Equal Variance[1]	Survival: T-Test Statistical Probability	Survival: Statistically Significant	Growth: Average Weight (mg)	Growth: F-Test Equal Variance[1]	Growth: T-Test Statistical Probability	Growth: Statistically Significant
12622	Control	0.94				1.761			
12611	Sample	0.97	0.379	0.160		2.240	0.826	0.031	
12612	Sample	0.64	0.004	0.018	*	2.643	0.027	0.040	
12613	Sample	0.40	0.012	0.000	*	4.071	0.014	0.001	
12614	Sample	0.53	0.002	0.009	*	2.996	0.016	0.016	
12638	Sample	0.14	0.001	0.001	*	0.956	0.002	0.137	
12639	Sample	0.31	0.005	0.000	*	2.686	0.019	0.042	
12640	Sample	0.16	0.002	0.001	*	0.053	NA[2]	0.000	*
12641	Sample	0.10	0.058	0.000	*	0.969	0.007	0.095	

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$).

1. If the F-Test result was significant (relative to the Laboratory Control, $P<0.05$), the T-Test was performed using unequal variances.
2. There were not enough sample and/or control response variablility to conduct a meaningful F-Test.

000015

Chironomus tentans
Acute Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3629/3633
Aquatec Biological Sciences

			Day 10 Data							
Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12622	A	10	10	1.00		53.37	73.08	10	1.971	
	B	10	10	1.00		59.34	65.47	10	0.613	
	C	10	9	0.90		51.16	64.49	9	1.481	
	D	10	10	1.00		56.01	76.25	10	2.024	
	E	10	8	0.80		56.63	71.64	8	1.851	
	F	10	9	0.90		56.14	78.78	9	2.516	
	G	10	9	0.90		55.87	73.42	9	1.950	
	H	10	10	1.00	0.94	47.21	63.02	10	1.581	1.781
12611*	A	10	10	1.00		35.81	60.20	10	2.439	
	B	10	9	0.90		45.33	63.29	9	1.882	
	C	10	10	1.00		39.77	63.67	10	2.390	
	D	10	9	0.90		35.30	57.97	9	2.519	
	E	10	10	1.00		47.71	65.44	10	1.773	
	F	10	10	1.00		40.74	63.70	10	2.296	
	G	10	*					*		
	H	10	10	1.00	0.97	34.78	63.78	10	2.898	2.240
12612	A	10	5	0.50		44.20	60.54	5	3.254	
	B	10	10	1.00		46.19	57.85	10	1.966	
	C	10	8	0.80		41.87	66.59	8	3.090	
	D	10	6	0.60		47.59	69.61	6	3.670	
	E	10	0	0.00				0	0.000	
	F	10	7	0.70		51.61	72.60	7	2.999	
	G	10	10	1.00		47.92	75.93	10	2.801	
	H	10	5	0.50	0.64	47.38	64.20	5	3.368	2.643
12613	A	10	1	0.10		46.77	53.48	1	6.710	
	B	10	9	0.90		45.64	66.77	9	2.348	
	C	10	7	0.70		44.60	71.69	7	3.541	
	D	10	2	0.20		42.20	47.83	2	2.815	
	E	10	3	0.30		51.92	62.36	3	3.513	
	F	10	6	0.60		50.58	77.40	6	4.470	
	G	10	1	0.10		50.00	53.66	1	3.640	
	H	10	3	0.30	0.40	50.43	64.61	3	4.727	4.071
12614	A	10	10	1.00		44.77	71.48	10	2.671	
	B	10	10	1.00		59.26	92.75	10	3.349	
	C	10	6	0.60		57.65	81.44	6	3.932	
	D	10	0	0.00				0	0.000	
	E	10	1	0.10		46.29	49.18	1	2.890	
	F	10	3	0.30		53.44	64.53	3	3.697	
	G	10	8	0.80		51.31	71.60	8	2.418	
	H	10	6	0.60	0.53	55.17	79.23	6	4.010	2.896
12638	A	10	0	0.00				0	0.000	
	B	10	0	0.00				0	0.000	
	C	10	0	0.00				0	0.000	
	D	10	0	0.00				0	0.000	
	E	10	0	0.00				0	0.000	
	F	10	0	0.00				0	0.000	
	G	11	11	1.00		54.43	83.74	11	2.665	
	H	10	1	0.10	0.14	51.78	56.77	1	4.990	0.956
12639	A	11	11	1.00		43.47	65.09	11	1.965	
	B	10	2	0.20		52.86	60.89	2	4.005	
	C	10	0	0.00				0	0.000	
	D	10	3	0.30		60.45	69.50	3	3.013	
	E	10	1	0.10		53.50	56.38	1	2.880	
	F	10	4	0.40		42.20	54.77	4	3.143	
	G	10	1	0.10		52.25	56.05	1	3.790	
	H	10	4	0.40	0.31	53.70	64.43	4	2.683	2.666
12640	A	10	0	0.00				0	0.000	
	B	10	0	0.00				0	0.000	
	C	10	0	0.00				0	0.000	
	D	10	10	1.00				0	0.000	
	E	10	0	0.00				0	0.000	
	F	10	*					*		
	G	10	1	0.10		29.53	29.90	1	0.370	
	H	10	0	0.00	0.15			0	0.000	0.053
12641	A	10	0	0.00				0	0.000	
	B	10	6	0.60		36.19	45.56	6	1.115	
	C	10	1	0.10		50.60	54.64	1	4.020	
	D	10	0	0.00				0	0.000	
	E	10	1	0.10		41.97	43.59	1	1.620	
	F	10	0	0.00				0	0.000	
	G	10	0	0.00				0	0.000	
	H	10	0	0.00	0.10			0	0.000	0.969

* A indigenous predator was found in the sample during breakdown on day 10. See protocol deviations.

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Acute Toxicity Test
BTR: 3641

		Survival				Growth			
Day 10		Proportion Surviving	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant	Average Weight (mg)	F-Test Equal Variance[1]	T-Test Statistical Probability	Statistically Significant
12668	Control	1.00				2.065			
12664	Sample	0.16	NA[2]	0.000	*	1.052	0.005	0.047	*
12665	Sample	0.55	NA[2]	0.000	*	2.699	0.173	0.024	
12666	Sample	0.13	NA[2]	0.000	*	0.346	0.306	0.000	*
12671	Sample	0.11	NA[2]	0.000	*	1.409	0.004	0.136	

* A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).
1. If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal va
2. There were not enough sample and/or control response variablility to conduct a meaningful F-Test.

Chironomus tentans
Acute Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3641
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	Day 10 Data: # Surviving	Proportion Surviving	Mean Proportion Surviving	Initial Boat Weight (mg)	Total Dry Weight (mg)	# Organism Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12668	A	10	10	1.00				0		
	B	10	10	1.00				0		
	C	10	10	1.00		36.90	57.53	10	2.063	
	D	10	10	1.00		38.94	64.79	10	2.585	
	E	10	10	1.00		40.44	57.73	10	1.729	
	F	10	10	1.00		36.10	56.71	10	2.061	
	G	10	10	1.00		43.85	60.76	10	1.691	
	H	10	10	1.00	1.00	36.95	59.57	10	2.262	2.065
12664	A	10	0	0.00				0	0.000	
	B	10	7	0.70		35.61	53.98	7	2.624	
	C	12	6	0.50		40.00	56.46	6	2.743	
	D	10	0	0.00				0	0.000	
	E	10	1	0.10		40.14	43.19	1	3.050	
	F	10	0	0.00				0	0.000	
	G	10	0	0.00				0	0.000	
	H	10	0	0.00	0.16			0	0.00	1.052
12665	A	10	9	0.90		37.51	56.22	9	2.079	
	B	10	8	0.80		37.80	59.66	8	2.733	
	C	10	8	0.80		32.59	54.27	8	2.710	
	D	10	4	0.40		35.21	51.61	4	4.100	
	E	10	8	0.80		35.84	52.66	8	2.103	
	F	10	4	0.40		42.47	54.17	4	2.925	
	G	10	2	0.20		37.61	42.38	2	2.385	
	H	10	1	0.10	0.55	36.05	38.61	1	2.560	2.699
12666	A	10	1	0.10		36.63	37.52	1	0.890	
	B	10	4	0.40		41.08	46.96	4	1.470	
	C	10	1	0.10		37.66	37.81	1	0.150	
	D	10	3	0.30		40.29	40.50	1	0.210	
	E	10	1	0.10		39.29	39.34	1	0.050	
	F	10	0	0.00				0	0.000	
	G	10	0	0.00				0	0.000	
	H	10	0	0.00	0.13			0	0.000	0.346
12671	A	10	0	0.00				0	0.000	
	B	10	0	0.00				0	0.000	
	C	10	4	0.40		46.24	55.53	4	2.323	
	D	10	0	0.00				0	0.000	
	E	10	1	0.10		44.61	47.60	1	2.990	
	F	10	3	0.30		46.30	55.50	3	3.067	
	G	10	1	0.10		40.12	43.01	1	2.890	
	H	10	0	0.00	0.11			0	0.000	1.409

APPENDIX: B

Aquatec Biological Sciences

Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE/ PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4°C
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453-4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453-7260			
Contact Name: Ken Cerreto, Ph.D	Quote #: 3/99 Client Code: MLNCUR	Hand Delivered: Yes No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS	
BTOX C-1	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.4
BTOX C-1-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.4
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity		
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity		
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity		

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth M Cerreto	10/4/99	17:00	Karen Dinsey
Relinquished by: (signature)	10/5/99	10:00	Received by: (signature)
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ____°C

3 Cooler

C\99033\A\COC1.doc

Aquatec Biological Sciences
Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE/ PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4°C
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453-4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453-7260			
Contact Name: Ken Cerreto, Ph.D.	Quote #: 3/99 Client Code: MENCUR	Hand Delivered: ___Yes ___No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX-C-3-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9				
BTOX-D-3	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9				
BTOX-D-3-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9				
BTOX-C-2-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9				
BTOX-C-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9				

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth M Cerreto	10/4/99	17:00	
Relinquished by: (signature)	DATE 10/5/99	TIME 10:00	Received by: (signature) Karen Downey
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery:_____ °C

3 Coolers

0001

Aquatec Biological Sciences
Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION

Name: Menzie Cura & Associates
Address: One Courthouse Lane, Suite 2
Chelmsford, MA 01824
Telephone: (978) 453-4300
Facsimile: (978) 453-7260
Contact Name: Ken Cerreto, Ph.D.

COMPANY'S PROJECT INFORMATION

Project Name: Dead Creek Sediment Tox
Project Number: 99033
Sampler Name(s):
Quote #: 3/99 Client Code: MENCUR

SHIPPING INFORMATION

Carrier:
Airbill Number:
Date Shipped:
Hand Delivered: Yes No

VOLUME/CONTAINER TYPE/PRESERVATIVE

4°C — — — — — —
plastic — — — — — —
1 gal

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX D)	10/1/			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-D-2-2	10/1/			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42 day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-D-1	10/1/			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX D-1-2	10/1/			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42 day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				
BTOX-C-3	10/1/			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5				

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth M Cerreto	10/4/99	19:00	
Relinquished by: (signature)	DATE	TIME	Received by: (signature)
	10/5/99	10:00	Karen Downey
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ____ °C

3 Coolers

Serial Number 13?910

SL ~~SAVANNAH LABORATORIES~~
~~& ENVIRONMENTAL SERVICES, INC.~~
Aquatech Colchester, VT

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

[In two (2) coolers]

[ ]	5102 LaRoche Avenue, Savannah, GA 31404	Phone: (912) 354-7858	Fax: (912) 352-0165
[ ]	2846 Industrial Plaza Drive, Tallahassee, FL 32301	Phone: (904) 878-3994	Fax: (904) 878-9504
[ ]	414 SW 12th Avenue, Deerfield Beach, FL 33442	Phone: (954) 421-7400	Fax: (954) 421-2584
[ ]	900 Lakeside Drive, Mobile, AL 36693	Phone: (334) 666-6633	Fax: (334) 666-6696
[ ]	6712 Benjamin Road, Suite 100, Tampa, FL 33634	Phone: (813) 885-7427	Fax: (813) 885-7049
[ ]	100 Alpha Drive, Suite 110, Destrehan, LA 70047	Phone: (504) 764-1100	Fax: (504) 725-1163

PROJECT REFERENCE: Sauget Area I
PROJECT NO.: 648B
P.O. NUMBER:
PROJECT LOC. (State): IL
SAMPLER(s) NAME: C. Menzie, K. Fogarty
PHONE: 978-453-4300
FAX: 978-453-7260
CLIENT NAME: ~~Solutia~~ Menzie-Cura
CLIENT PROJECT MANAGER: C. Menzie
CLIENT ADDRESS (CITY, STATE, ZIP): 1 Courthouse Lane Suite 2 Chelmsford MA

MATRIX TYPE: AQUEOUS (WATER) / SOLID OR SEMISOLID / AIR / NONAQUEOUS LIQUID (oil, solvent, etc.)

REQUIRED ANALYSES: Sed tox - Hazleton / Chironomus tentans and Hyalella azteca (?) — Sed tox-Hazteca Clentaus auts + chromic

PAGE 1 OF 1

[X] STANDARD REPORT DELIVERY
[ ] EXPEDITED REPORT DELIVERY (surcharge)
Date Due

SAMPLE DATE	SAMPLE TIME	SL NO.	SAMPLE IDENTIFICATION	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID	NUMBER OF CONTAINERS SUBMITTED	REMARKS
10/5/99	9:45		BTOX-B-1		X			2	
10/5/99	9:45		BTOX-B-1 (dupe)		X			2	
10/5/99	14:10		BTOX-B-2		X			2	
10/5/99	9:00		BTOX-B-3		X			2	
10/5/99	13:40		BTOX-M		X			2	

Cooler Temp = 1.2°C (Large cooler)
Cooler Temp = 0.5°C (Small cooler)

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Katherine O Fogarty	10/5/99	1725						
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Karen Dinkey	10/6/99	10:00						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SL LOG NO.	LABORATORY REMARKS:
			[ ] YES [ ] NO			

ORIGINAL

CHAIN OF CUSTODY RECORD

Project No: 648B
Project Name: Sauget Area I Dead Creek
Project Location: Sauget/Cahokia, IL

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7200

DATE: 10/6/99

SAMPLERS: Chen..., K. Fogarty

SAMPLE ID	Date	Comp.	Time Grab	Station Locations	No. of Containers	Bioassay See note (1)					NOTES
E-1	10/6/99	✓	9:50	Dead Creek Sed. E	2	X					
E-2	↓	✓	9:05	↓	2	X					
E-3		✓	12:10		2	X					
BP-1			11:30	Borrow Pit	2	X					
BP-1(Dupe)			11:30	↓	2	X					
BP-3	↓		10:30		2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fogarty	10/6/99	1900	Karen Dixon	10/7/99	10:00
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Note (1) H. azteca / C. tentans acute / chronic sediment toxicity tests

Laboratory: Aquatech

Phone:

Contact Person: Phil. Downey

Via Fedex in 3 coolers

Cooler #1 Temp = 3.1°C - BP + E3
Cooler #2 Temp = 3.2°C - BP1 + BP1
Cooler #3 Temp = ... 5°C ...

PAGE 1 OF 1

CHAIN OF CUSTODY RECORD

Project No.: 648 B
Project Name: Dead Creek - Sauget Area I
Project Location: Sauget/Cahokia, Ill

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

DATE: 10/7/99

SAMPLERS: C. Menzie, K Fogarty

SAMPLE ID	Date	Time ~~Comp.~~	~~Grab~~	Station Locations	No. of Containers	Analyses Required: H. azteca's C. tentans acute; chronic					NOTES
BP-2	10/7/99	9:30		Barrow Pit	2	X					C1 C1
F-1	↓	15:00		Dead Creek - Section F	2	X					C2 C2
F-2	↓	16:10		↓	2	X					C1 C2
F-3	↓	10:45		↓	2	X					C1 C2
											Cooler 1 2.3°C
											Cooler 2 2.7°C

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine A Fogarty	10/7/99	18:00	Philip Downey	10/8/99	10:30

Remarks: Sent in 2 coolers via Fedex

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

CHAIN OF CUSTODY RECORD

Project No.: 648B

Project Name: Dead Creek - Sauget Area I

Project Location: Sauget - Cahokia, Ill.

DATE: 10/8/99

SAMPLERS: C Menzie, K Fogarty

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	Analyses Required: [illegible]					NOTES
PDC-1	10/8/99	9:30		Prairie du Pont Creek	2	X					
PDC-2	↓	11:20		" " "	2	X					
Ref-1	↓	16:30		Ref Creek	2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fogarty	10/8/99	18:30			
	10/9/99	10:30	J. Gilbert		

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

Remarks: 2 coolers via Fedex
Shipping bill No
811399409571

Cooler #1 1°C
Temp #2 3.1°C

CHAIN OF CUSTODY RECORD

Project No.	Project Name:	Project Location:
648B	Dead Creek - Sauget Area I	Sauget / Cahokia, Ill.

DATE: 10/9/99

SAMPLERS: C. Menzie, K. Fogarty

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

	SAMPLE ID	Date	Time ~~Comp.~~	Grab	Station Locations	No. of Containers	Analyses Required: H. azteca + C. tentans acute + chronic					NOTES
BTOX	Refa-2	10/9/99	10:30	✓	Reference Borrow Pit	2	✓					
												Temp = 0.6°C

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fogarty	10/9/99	12:30			
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Sent via US Air Counter to Counter

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

000016

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3615
	Test Start: October 7, 1999	Test End: October 17, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12546	A	4	JG	0	RB	4	4	36.85	53.60
	B	2	JG	—	—	2	2	40.08	47.98
	C	2	JM	—	—	2	2	35.91	46.39
	D	0	JM	0	JM	0	0	~~35.57~~	—
N	E	6	JG	—	—	6	6	31.81	51.42
	F	5	JG	—	—	5	5	36.63	49.64
	G pupa	0+1P	RB	0	JM	1	0	34.45	—
	H pupa	3+1P	RB	0	TM	4	3	30.27	42.24

Acute only

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12547	A	0	RB	0	RB	0	0	36.14	
	B 1	0	JG	—	—	0		33.06	
	C	0	RB	0	RB	0		31.95	
M	D	0	TM	—	—	0		33.53	
	E	0	TM	—	—	0		35.11	
	F	✱2 0	TM	0	JM	0		32.94	
	G	0	JG	0	JM	0		34.10	
	H	0	RB	0	JG	0		31.73	

Acute only

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12548	A	10	TM	—	—	10	10	30.00	56.51
	B	10	JG	—	—	10	10	27.30	49.64
	C	10	TM	—	—	10	10	29.43	58.90
D	D	0	TM	—	—	0	Large leech present		—
	E	8	JG	—	—	8	8	28.53	45.64
	F	9	RB	—	—	9	9	28.93	51.70
	G	10	RB	—	—	10	10	29.98	42.54
	H	10	RB	—	—	10	10	32.39	59.33

Chronic

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12549	A pupa	4+1(4)	RB	0	RB	5	4	32.45	49.59
	B	5	RB	—	—	5	5	33.33 ~~32.60~~	55.07
	C	0	RB	0	RB	0	0	—	—
N	D	8	TM	—	—	8 JM	8	32.59	57.67
	E	4	TM	—	—	4	4	37.68	52.76
	F pupa	3+1P	JG	—	—	~~3~~ 4 JG	3	34.21	47.00
	G dead	3	JG	—	—	3	3	32.60	41.17
	H	5	RB	1	RB	6	6	33.91	43.43

Acute only

Initial 19.97 10/28

Balance QC: Initial (20 mg = 19.96) Final (20 mg = 19.97) Balance Asset #:

Date/time In Temp(°C) Init. Date/time out 10/28/99 17:00 Temp(°C) 82° Init. TM

Comments:

✱ Pupae not included in weights. JG. 10/17/99

Reviewer: J Date: 12/10/99.

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✱2 Dragonfly nymph present 10/17 JM

1 [illegible]

000017

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3615
	Test Start: October 7, 1999	Test End: October 17, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12550	A	1	JG	—	—	1	1	32.87	35.62
	B 1dead	2	RB	—	—	2	2	31.55	36.98
	C 1dead	9	JG	—	—	9 ~~8~~ JG	9	29.56	54.14
	D	~~2~~ 4	RB	—	—	4	4	39.14	48.55
Y	E	4 (small)	J	No sed. was left	—	4	4	27.05	38.51
	F 1 dead pupae	3 (+1p) larvae	JG	—	—	~~3~~ 4 JG	3	33.26	43.44
	G	6	JG	—	—	6	6	27.47	44.63
	H	8	JG	—	—	8	8	25.50	52.40
12551	A	7	JG	—	—	7	7	32.77	52.89
	B	4	RB	—	—	4	4	34.14	50.83
	C	6	RB	—	—	6	6	34.26	59.68
1 emergent case →	D	8 1 emerged	TM	—	—	9	9	34.46	62.72
	E ①	0	JG	—	—	0	0	~~32.67~~	—
Y	F	8 JG	RB	—	—	8	8	~~[illegible]~~	58.07
	G 1 empty case	~~7~~ 6 7	~~JG~~	—	—	7	~~7~~ 6	35.13 ~~32.67~~	54.47
	H	9	RB	—	—	9	9	38.67	62.56
12552	A	10	RB	—	—	10	10	38.90	60.60
	B	10	J	—	—	10	10	32.07	61.15
1dead	C	8	RB	—	—	8	8	28.90	49.39
	D	10	JG	—	—	10	10	37.56	61.28
	E	10	RB	—	—	10	10	29.48	53.70
	F	10	J	—	—	10	10 JG	29.16	54.08
	G 1pupa	9+1p	JG	—	—	10	② ~~10~~ 9	35.09	58.20
	H	10	JG	—	—	10	10	37.77	67.00
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

Chronic

Chronic

Chronic

Balance QC: Initial (20 mg =) Final (20 mg =) Balance Asset #:

Date/time In Temp(°C) Init. Date/time out Temp(°C) Init.

Comments:

① One Odonata found (predator.) 10/18/99 JG

② Nine larva weighed. correction 12/10/99 JG

Reviewer Date

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Rev. 12/10/99

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Chironomus tentans Head Capsule Width

Culture ID: 9/25, 9/26, 9/27 Age (d) of larvae: 10-12 days

Magnification: 32 Ocular micrometer calibration: 35 micrometer units = 1 mm
Microscope Asset #: 2929

Calculation of head capsule width:
head capsule width (micrometer units) / micrometer calibration units

Organism Number	Head Capsule Width (micrometer units)	Head Capsule Width (mm)
1	14	0.40
2	14	0.40
3	28	0.80
4	25	0.71
5	12	0.34
6	27	0.77
7	13	0.37
8	14	0.40
9	14	0.40
10	12	0.34
11	13	0.37
12	13	0.37
13	14	0.40
14	14	0.40
15	14	0.40
16	15	0.43
17	-	-
18	-	-
19	-	-
20	-	-
Initials: JWW	Larval heads were severed and mounted on a slide for measurement.	
Date: 12/10/99	Subset of larvae used to start Samples 12546, 12547, 12548, 12549, 12550, 12551, 12552 on 10/7/99.	

Reviewer: jww Date: ______.
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

cthdcapw10799

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/27	Larva Hatch Date: 9/27	Culture ID: 9/27
Culture Source (flies): Aquatec	No. Egg Cases: 2	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body castes.

444

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/27	0					Se			TM
9/28	1					Sel		Still hatching	
9/29	2	21.8				TC		[illegible]	T
9/30	3					T/C		~200 larvae	
10/1	4					TC 1/2			JG
10/2	5					TC 1/2 / TC			JG
10/3	6					TC			JG
10/4	7					TC			JG
10/5	8					TC			JG
10/6	9	22.7	7.9	8.6		TC		TC 1/2 box [illegible]	J
10/7	10								
10/7	Test Starts	Samples	12546	12547	12548	12549	12550	12537	
			12552						

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Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/23	Larval Hatch Date: 9/26	Culture ID: 9/26
Culture Source (flies): Aquatec	No. Egg Cases: 3	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body castes.

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/26	0					sel			TM
9/27	1					sel			TM
9/28	2					Sel/TCl			J
9/29	3					TC		≈ 450 larvae	J
9/30	4					~~TC/1.6/TC~~			~~JG~~
10/1	5					TC/1.6/TC			JG
10/2	6					TC			JG
10/3	7					TC			JG
10/4	8					TC			JG
10/5	9					TC			JG
10/6	10	22.8				TC		Combined w/ 9/27 Culture	J
10/7	11								

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/21	Larva Hatch Date: 9/25	Culture ID: 9/25
Culture Source (flies): Aquatec	No. Egg Cases: 2	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body castes.

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/25	0					Sel			TM
9/26	1					Sel			TM
9/27	2					Sel/TC		added sand [illegible]	TM
9/28	3					Sel/TC		Approx. 50 larvae	
9/29	4					TC			[illegible]
9/30	5								
10/1	6					TC/[illegible]			JG
10/2	7					TC			JG
10/3	8					TC			JG
10/4	9					TC			JG
10/5	10					TC			JG
10/6	11	22.9				TC			[illegible]
10/7	12								[illegible]

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Starts ~~9/7/99~~ 10/7/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12546	T (ºC)	23.2	22.4	23.0	22.2	23.4	22.2	23.7	22.9	22.4	22.8	22.6
	pH	7.8	X	X	X	X	7.5	X	X	X	X	7.4
	DO (mg/L)	6.5	6.1	5.5	5.3	5.6	5.4	4.5	4.7	5.0	6.9	4.5
	Conductivity	350	X	X	X	X	370	X	X	X	X	350
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12547	T (ºC)	23.3	23.2	22.9	22.9	24.0	21.9	22.6	22.7	22.8	22.9	22.8
	pH	7.8	X	X	X	X	7.5	X	X	X	X	7.4
	DO (mg/L)	6.2	5.6	5.8	6.0	5.7	5.4	6.1	5.5	5.4	6.8	5.2
	Conductivity	360	X	X	X	X	370	X	X	X	X	370
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12548	T (ºC)	23.3	23.2	22.7	22.9	23.3	22.4	22.7	22.9	22.8	23.1	22.8
	pH	7.8	X	X	X	X	7.4	X	X	X	X	7.5
	DO (mg/L)	6.4	5.4	5.4	4.9	4.4	4.3	4.6	4.1	4.5	6.0	4.4
	Conductivity	350	X	X	X	X	385	X	X	X	X	390
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/7 JG	10/8 JM	10/9 JG	10/10 JM	10/11 JM	10/12 JM	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JG

Comments: TEST START 10/7/99 1630-1800

Review: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000023

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzio-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Starts ~~9/7/99~~ 10/7/99

Sample	Paramotor	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12549	T (°C)	22.9	22.1	22.8	22.7	22.9	22.7	23.0	22.9	22.9	23.0	22.7
	pH	7.8	X	X	X	X	7.6	X	X	X	X	7.6
	DO (mg/L)	6.9	6.3	6.0	5.3	4.9	4.9	4.6	5.1	5.2	6.4	4.5
	Conductivity	360	X	X	X	X	310	X	X	X	X	390
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12550	T (°C)	23.0	22.2	22.9	23.2	23.0	22.4	23.1	22.7	22.9	22.9	23.1
	pH	7.6	X	X	X	X	7.5	X	X	X	X	7.5
	DO (mg/L)	6.0	6.0	5.2	4.9	4.2	4.6	4.2	4.1	5.3	6.6	4.3
	Conductivity	370	X	X	X	X	370	X	X	X	X	380
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12551	T (°C)	22.9	23.4	23.4	23.2	23.1	22.7	23.6	23.0	23.3	22.9	23.1
	pH	7.7	X	X	X	X	7.6	X	X	X	X	7.6
	DO (mg/L)	5.9	5.9	5.3	5.2	4.5	4.5	4.4	4.8	4.8	6.2	4.3
	Conductivity	360	X	X	X	X	310	X	X	X	X	390
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/7 JG	10/8 JM	10/9 [illegible]	10/10 JM	10/11 JM	10/12 JM	10/13 JM	10/14 JM	10/15 JG	10/16 KG	10/17 JG

Comments:

Review: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 Test Starts ~~9/7~~ 10/7/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12552	T (ºC)	23.3	23.3	23.5	23.4	23.3	22.5	23.6	22.1	23.2	22.4	23.4
	pH	7.3	X	X	X	X	7.6	X	X	X JG	X	7.7
	DO (mg/L)	7.7	7.1	8.0	6.1	6.0	5.9	6.0	6.3	~~5~~ 6.2	7.2	7.0
	Conductivity	400	X	X	X	X	390	X	X	X	X	389
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	T (ºC)											
	pH		X	X	X	X		X	X	X	X	
	DO (mg/L)											
	Conductivity		X	X	X	X		X	X	X	X	
	Ammonia, alk/hardness Sulfide		X	X	X	X	X	X	X	X	X	
	T (ºC)											
	pH		X	X	X	X		X	X	X	X	
	DO (mg/L)											
	Conductivity		X	X	X	X		X	X	X	X	
	Ammonia, alk/hardness Sulfide		X	X	X	X	X	X	X	X	X	
	Init./Date (1999):	10/7 JG	10/8 JM	10/9 JS	10/10 JM	10/11 JM	10/12 JM	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JG

Comments:

Review: [signature] Date: 12/10/99

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000050

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3622 / 3629
	Test Start: October 8, 1999	Test End: October 18, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12589	A	0	TM	—	—	0			
	B	0	TM	—	—	0			
	C	0	RB	—	—	0			
	D	0	TM	—	—	0			
	E	0	TM	—	—	0			
	F	0	TM	—	—	0			
	G	0	RB	—	—	0			
	H	0	JG	—	—	0			
12590	A	1	TM	—	—	1	~~3~~ 1 TM	38.84	40.32
	B	0	RB	—	—	0	—	—	—
	C	0	RB	—	—	0	—	—	—
	D	0	TM	—	—	0	—	—	—
	E	0	TM	—	—	0	—	—	—
	F	0	TM	—	—	0	—	—	—
	G	0	JG	—	—	0	—	—	—
	H	2	JG	—	—	2	2	29.69	35.20
12591	A	0	TM	—	—	0			
	B	0	RB	—	—	0			
	C	0	JG	—	—	0			
	D	0	RB	—	—	0			
	E	0	TM	—	—	0			
	F	0	JG	—	—	0			
	G	0	TM	—	—	0			
	H	0	JG	—	—	0			
12592	A	3 large 10 small	JG	0	—	13	13	36.37	48.11
	B	3 large 25 small	TM	—	—	28	28	30.32	45.92
	C small	18	TM	—	—	18	18	32.71	37.38
	D 1 large dead	11	RB	—	—	11	11	39.20	48.63
	E very small	18	JG	—	—	18	18	42.72	45.55
	F some small	15	TM	—	—	15	15	34.39	52.14
	G small	11	RB	—	—	11	11	38.29	41.62
	H small	8	RB	—	—	8	8	35.96	39.40

12589: Acute only

12590: Acute only

12591: Acute only

12592: chronic

sieve → yes

single

Excess Chironomids (Appear to be C. tentans) believed to be indigenous

Balance QC: Initial (20 mg = 19.98) Final (20 mg = 19.98) Balance Asset #:

Date/time In 11/[illegible] 13:15 Temp(°C) 21 Init. TM Date/time out 11/2/1? 7:30 Temp(°C) 24 Init. JG

Comments:

Some were also found in the Hyalella reps.

Sample 12592 sieved (0.32 m) for C.T. chronic

Reviewer J Date 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000020

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3622 / 3629
	Test Start: October 8, 1999	Test End: October 18, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12593	A	9	TM	—	—	9	9	33.78	51.62
	B	9	TM	—	—	9	9	43.18	60.67
	C	11	JG	—	—	11	11	36.03	57.58
	D	10	RB	—	—	10	10	35.15	50.58
	E	10	JG	—	—	10	10	40.43	60.22
	F	~~10~~ 9	~~JG~~ RB	—	—	~~10~~ 9 RB	8	35.86	50.59
	G	10	TM	—	—	10	9	35.16	56.80
	H	10	RB	—	—	10	10	36.52	57.14
12609	A	8	RB	—	—	8	8	31.56	39.77
	B	10	RB	—	—	10	10	31.99	42.69
	C	10	RB	—	—	10	10	32.11	41.76
	other Chironomids D	8	TM	—	—	8	8	32.66	39.06
	E	10	TM	—	—	10	10	38.79	53.66
	F pupa	9	RB	—	—	9	8	31.67	39.99
	G	9	JG	—	—	9	9	27.38	35.53
	H	9	JG	—	—	9	9	26.07	38.09
12610	A	2	TM	—	—	2	2	32.27	41.92
	B	0	JG	—	—	0	—	~~29.80~~	—
	C	0	TM	—	—	0	—	~~33.52~~	—
	D	1	TM	—	—	1	1	34.50	39.01
	E	0	TM	—	—	0	—	~~32.86~~	—
	F	1	TM	—	—	1	1	34.19	34.92
	G	0	RB	—	—	0	—	~~34.08~~	—
	H	9	JG	—	—	9	9	32.34	49.85
12615	A	10	RB	—	—	10	10	28.81	48.78
	B	10	JG	—	—	10	10	31.95	53.69
	C	10	TM	—	—	10	10	33.29	51.53
	D	10	RB	—	—	10	10	27.77	41.70
	E	10	JG	—	—	10	10	27.97	52.01
	F	10	TM	—	—	10	10	34.55	53.20
	G	11	RB	—	—	11	11	27.97	45.71
	H	10	JG	—	—	10	10	29.90	50.95

Balance QC: Initial (20 mg = 19.98) Final (20 mg = 19.98) Balance Asset #:
Date/time In 11/1 17:15 Temp(°C) 81° Init. TM Date/time out 11/2 17:30 Temp(°C) 84 Init. JG
Comments:

Reviewer: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000027

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/23	Larval Hatch Date: 9/26	Culture ID: 9/26
Culture Source (flies): Aquatec	No. Egg Cases: 3

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry; change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body cases.

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/26	0					SEL			JM
9/27	1					SEL			JM
9/28	2					Sel TC		[illegible]	J
9/29	3					TC		[illegible] larvae	J
9/30	4					~~[illegible]~~			~~JG~~
10/1	5					TC/[illegible] TC			JG
10/2	6					TC			JG
10/3	7					TC			JG
10/4	8					TC			JG
10/5	9					TC			JG
10/6	10	22.8				TC		Combined w/ 9/27 Culture	J
10/7	11					TC			J
10/8	12							Used for Test START	J

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/24	Larval Hatch Date: 9/27	Culture ID: 9/27
Culture Source (flies): Aquatec	No. Egg Cases: 3	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body casies.

1999

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/27	0					Sel.			TM
9/28	1					Sel		Still hatching	
9/29	2	21.8				TCL		Beginning tube formation	JT
9/30	3					TCL		≈ 200 larvae	
10/1	4					TC/.6			JG
10/2	5					TC/.8/TC			JG
10/3	6					TC 0/			JG
10/4	7					TC			JG
10/5	8					TC			JG
10/6	9	22.7	7.9	8.6		TC		To lg box w/9/26 culture combined	Tym
10/7	10					TC			TM
10/8	11							Used for test starts	JT

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date	9/25	Larval Hatch Date	9/28	Culture ID	9/28
Culture Source (flies)	Aquatec	No. Egg Cases:	3 4		

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body castes.

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/28	0					Sel.			TM
9/29	1					TC		[illegible]	T
9/30	2					TC		≈ 200 larvae	T
10/1	3					TC 1/2			JG
[illegible]	4					TC 1/2 / TC			JG
[illegible]	5					TC 1/2 / TC			JG
[illegible]	6					TC			JG
[illegible]	7					TC		To [illegible] box	JG
[illegible]	8	21.6	7.7	7.4					JM
[illegible]	9					TC			JM
[illegible]	10							Used for test STARTS	T

Chironomus tentans Head Capsule Width

Culture ID: 9/26, 9/27, 9/28 Age (d) of larvae: 10-12 days

Magnification: 32 Ocular micrometer calibration: 35 micrometer units = 1 mm
Microscope Asset #: 2929

Calculation of head capsule width:
head capsule width (micrometer units) / micrometer calibration units

Organism Number	Head Capsule Width (micrometer units)	Head Capsule Width (mm)
1	8	0.23
2	11	0.31
3	14	0.40
4	7	0.20
5	13	0.37
6	7	0.20
7	15	0.43
8	14	0.40
9	15	0.43
10	14	0.40
11	14	0.40
12	14	0.40
13	13	0.37
14	15	0.43
15	15	0.43
16	-	-
17	-	-
18	-	-
19	-	-
20	-	-
Initials: JWW	Larval heads were severed and mounted on a slide for measurement.	
Date: 12/10/99	Subset of larvae used to start Samples 12589, 12590, 12591, 12592, 12593, 12609, 12610 on 10/8/99.	

Reviewer: jww Date: ______.
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

cthdcapw10899

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 / 3629 Test Starts ~~9~~10/8/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12589	T (°C)	21.7	25.8	25.6	23.3	23.2	23.2	22.9	22.8	22.3	23.1	22.9
	pH	7.9	X	X	X	X	7.7	X	X	X	X	7.7
	DO (mg/L)	7.0	5.7	6.0	5.7	5.7	5.2	6.0	6.3	7.2	5.6	5.9
	Conductivity	370	X	X	X	X	390	X	X	X	X	320
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12590	T (°C)	21.7	25.7	25.7	23.2	22.9	23.0	22.9	22.5	22.2	22.8	22.8
	pH	7.9	X	X	X	X	7.7	X	X	X	X	7.7
	DO (mg/L)	7.2	5.7	6.0	5.4	5.6	5.4	5.7	6.1	7.0	5.4	5.9
	Conductivity	360	X	X	X	X	410	X	X	X	X	320
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12591	T (°C)	21.4	25.6	25.6	23.1	22.9	23.0	22.8	22.5	22.8	22.9	22.9
	pH	7.6	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	7.4	6.3	6.6	6.4	7.0	6.6	6.7	6.9	7.4	6.2	6.6
	Conductivity	360	X	X	X	X	390	X	X	X	X	380
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/8 JG	10/9 JG	10/10 JM	10/11 JM	10/12 JM	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JM	10/18

Comments:

Review: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000032

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3622 / 3629 Test Starts ~~9~~ 10/8/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12610	T (ºC)	21.9	26.0	26.5	23.3	23.3	23.4	22.9	23.0	23.0	23.4	22.7
	pH	7.8	X	X	X	X	7.6	X	X	X	X	7.7
	DO (mg/L)	6.5	5.5	5.7	5.7	6.6	4.7	4.5	5.5	6.6	5.5	6.0
	Conductivity	410	X	X	X	X	420	X	X	X	X	378
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12615	T (ºC)	21.9	26.4	26.7	23.3	23.3	23.5	23.4	23.1	23.2	23.7	22.7
	pH	7.6	X	X	X	X	7.7	X	X	X	X	7.7
	DO (mg/L)	8.1	6.4	6.3	6.3	6.4	6.1	6.1	6.2	7.1	6.6	6.7
	Conductivity	380	X	X	X	X	410	X	X	X	X	350
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	T (ºC)											
	pH		X	X	X	X		X	X	X	X	
	DO (mg/L)											
	Conductivity		X	X	X	X		X	X	X	X	
	Ammonia, alk/hardness Sulfide		X	X	X	X	X	X	X	X	X	
	Init./Date (1999):	10/8 JG	10/9 JS	10/10 JM	10/11 JM	10/12 JM	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JM	10/18

Comments:

Review: ______ Date: 12/10/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000034

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3629 / 3633
	Test Start: October 9, 1999	Test End: October 19, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.	
12611	A	10	— TM	—	—	10	10	38.81	60.20	
	B	~~8~~ 9	TM	—	—	~~8~~ 9	9	48.33	63.29	To Chronic
	C	10	RB	—	—	10	10	39.77	63.67	
	D	9	TM	—	—	9	9	35.30	57.97	
	E	10	JS	—	—	10	10	47.71	65.44	
	F	10	RB	—	—	10	10	40.74	63.70	
predator	G	0	RB	—	—	0	—	43.13	—	
	H	10	TM	—	—	10	10	34.78	63.76	
12612	A	5	JG	—	—	5	5	44.27	60.54	
	B	10	RB	—	—	10	10	48.19	67.85	To Chronic
	C	8	JG	—	—	8	8	41.87	66.59	
	D	6	RB	—	—	6	6	47.59	69.61	
	E	0	TM	—	—	0	—	~~45.13~~	—	
	F	7	TM	—	—	7	7	51.61	72.60	
	G	10	JS	—	—	10	10	4792	75.93	
	H	5 + pupa	TM	—	—	5	5	47.38	64.22	
12613	A dead	1	RB	—	—	1	1	46.77	53.48	
	B	~~8~~ 9	TM	—	—	~~8~~ 9	9	45.64	66.77	To Chronic
	C	7	TM	—	—	7	7	44.80	71.69	
	D	2	TM	—	—	2	2	42.20	47.83	
	E	3	TM	—	—	3	3	51.92	63.36	
	F	6	JS	—	—	6	6	50.58	77.40	
	G	1	TM	—	—	1	1	50.02	53.86	
	H	3	RB	—	—	3	3	50.43	64.61	
12614	A	10	JG	—	—	10	10	44.77	71.48	
	B	10	RB	—	—	10	10	59.26	92.75	To Chronic
	C	6	RB	—	—	6	6	57.85	81.44	
	D	0	JG	—	—	0	—	~~57.11~~	—	
	E	1	TM	—	—	1	1	46.29	49.18	
	F	3	JS	—	—	3	3	53.44	64.53	
	G	6	JS	—	—	6	6	51.31	71.82	
	H	6	TM	—	—	6	6	55.17	79.23	

Balance QC: Initial (20 mg = 19.99	Final (20 mg = 19.99)	Balance Asset #:
Date/time In 11/7 16:30 Temp(°C) 72°C Init. TM	Date/time out	Temp(°C) Init.
Comments: 11/8/99 20 mg = 19.995		

Reviewer ______ Date 12/10/99
Laboratory Aquatec Biological Sciences, South Burlington Vermont

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000035

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3629 / 3633
	Test Start: October 9, 1999	Test End: October 19, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12622	A	10	RB	—	—	10	10	53.37	73.08
	B	10	JG	—	—	10	10	59.34	68.47
	C	9	TM	—	—	9	9	51.16	64.49
	D	10	TM	—	—	10	10	56.01	76.25
	E	8	TM	—	—	8	8	58.63	71.84
	F	9	JG	—	—	9	9	56.14	78.78
	G	9	JG	—	—	9	9	55.87	73.42
	H	10	JG	—	—	10	10	47.21	63.02

To Chronic

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12638	A	0	TM	—	—	0	—	—	—
	B	0 (1 dead)	JG	—	—	0	—	—	—
	C	0	JG	—	—	0	—	—	—
	D	0	TM	—	—	0	—	—	—
	E	0	TM	—	—	0	—	—	—
	F	0	RB	—	—	0	—	—	—
1 pupa	G *	11	RB	—	—	11	11	54.43	83.74
	H	1	YS	—	—	1	1	51.79	56.77

Acute only

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12639	A	11 (3 small)	TM	—	—	11	11	43.47	65.09
	B	2 alive/1 dead	JG	—	—	2	2	52.88	60.89
	C	0	TM	—	—	0	—	—	—
	D	3	RB	—	—	3	3	60.46	69.50
	E	1	RB	—	—	1	1	53.50	56.38
	F +1 Dead	4 JM	TM	—	—	4 JM	4	42.20	54.77
	G	~~0~~ 1	TM	—	—	~~0~~ 1	1	52.26	56.05
	H	4	RB	—	—	4	4	53.72	64.49

Acute only

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12640	A	0	JG	—	—	0	—	—	—
	B	0	TM	—	—	0	—	—	—
	C	0	JG	—	—	0	—	—	—
	D	10	JG	—	—	10	—	~~37.48~~	—
	E	0	TM	—	—	0	—	—	—
odonata present	F *	0	TM	—	—	0	—	—	—
	G	1	YS	—	—	1	1	29.53	29.90
	H	0	TM	—	—	0	—	—	—

Acute only
* None in vial TM 11/7

Balance QC: Initial (20 mg = 19.99)	Final (20 mg = 19.99)	Balance Asset #:
Date/time In 11/7 16:30 Temp(°C) 72 °C Init. TM	Date/time out	Temp(°C) Init.
Comments:		

Reviewer: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3629 / 3633
	Test Start: October 9, 1999	Test End: October 19, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12641	A	0	RB	—	—	0	—	—	—
	B	6	JG	—	—	6	6	36.19	48.88
	C	1	TM	—	—	1	1	50.62	54.64
	D	0	TM	—	—	0	—	—	—
	E	1	RB	—	—	1	1	41.97	43.59
	F	0	TM	—	—	0	—	—	—
	G	0	RB	—	—	0	—	—	—
	H	0	[illegible]	—	—	0	—	—	—
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

Acute only

Balance QC: Initial (20 mg = 19.99)	Final (20 mg = [illegible]0.49)	Balance Asset #:
Date/time In [illegible] Temp(°C) [illegible] °C Init. [illegible]	Date/time out	Temp(°C) Init.
Comments:		

Reviewer [illegible] Date 12/10/99

Laboratory Aquatec Biological Sciences, South Burlington, Vermont

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000037

Chironomus tentans Head Capsule Width

Culture ID: 9/28, 9/29 Age (d) of larvae: 10-11 days

Magnification: 32 Ocular micrometer calibration: 35 micrometer units = 1 mm
Microscope Asset #: 2929

Calculation of head capsule width:
head capsule width (micrometer units) / micrometer calibration units

Organism Number	Head Capsule Width (micrometer units)	Head Capsule Width (mm)
1	7	0.20
2	15	0.43
3	13	0.37
4	15	0.43
5	7	0.20
6	13	0.37
7	14	0.40
8	14	0.40
9	13	0.37
10	7	0.20
11	14	0.40
12	7	0.20
13	16	0.46
14	6	0.17
15	7	0.20
16	13	0.37
17	14	0.40
18	13	0.37
19	14	0.40
20	13	0.37
Initials: JWW	Larval heads were severed and mounted on a slide for measurement.	
Date: 12/10/99	Subset of larvae used to start Samples 12611, 12612, 12613, 12614, 12622, 12638, 12639, 12640, 12641 on 10/9/99.	

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/25	Larval Hatch Date: 9/28	Culture ID: 9/28
Culture Source (flies): Aquatec	No. Egg Cases: 3 4	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs remove flies daily to mating flask or disposal flask. Remove discarded body castes

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/28	0					Sel.			TM
9/29	[illegible]					TC [illegible]		[illegible] hatching [illegible]	JT
9/30	2					TC [illegible]		≈ 200 larvae	J
10/1	3					TC 1.0			JG
[illegible]	4					TC 1.0/[illegible]			JG
[illegible]	5					TC 1.0/TC			JG
[illegible]	6					TC			JG
[illegible]	7					TC		To medium box	JG
[illegible]	[illegible]	21.9	7.7	[illegible]					
[illegible]/7	[illegible]					TC			~~JM~~ JM
[illegible]/8	[illegible]					TC		Used for Test Start	TM
10/9	11					TC		Used for test starts	JT
								BTR 3629/3633	

Aquatec Biological Sciences, South Burlington, Vermont

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000039

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/26	Larval Hatch Date:	Culture ID: -9/29
Culture Source (flies): Aquatec	No. Egg Cases: 2	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum.* Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body castes.

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/29	0					Sel		→ small box	
9/30	1					Sel / TC C.		Tubes forming	
10/1	2					TC / 1G.		tubes visible	JG
10/2	3					TC / 1G D			JG
10/3	4					TC / D / TC			JG
10/4	5					TC D1			JG
10/5	6					TC			JG
10/6	7	22.7	8.1	8.2		TC	✓	To lg box	J
10/7	8					TC			JM
10/8	9					TC			JM
10/9	10					TC		Used for Test Starts	J
	11							BTR 3629/3633	J
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
	25								

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 3633 Test Starts 10/9/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12611	T (°C)	23.2	21.6	21.6	21.0	~~21.4~~ 20.9	23.3	23.3	23.3	23.4	23.3	23.4
	pH	7.7	X	X	X	X	7.5	X	X	X	X	7.6
	DO (mg/L)	5.8	6.3	7.0	6.7	5.4	4.6	6.7	6.3	4.6	4.9	5.1
	Conductivity	410	X	X	X	X	360	X	X	X	X	360
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12612	T (°C)	22.8	21.5	21.7	21.5	21.1	23.1	23.0	23.1	23.4	23.3	23.2
	pH	8.0	X	X	X	X	7.6	X	X	X	X	7.7
	DO (mg/L)	8.0	6.9	7.3	6.4	6.0	4.5	7.8	6.9	5.4	5.8	5.8
	Conductivity	410	X	X	X	X	390	X	X	X	X	370
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12613	T (°C)	22.9	21.4	21.6	21.4	21.1	23.2	23.0	23.2	23.3	23.3	22.9
	pH	8.0	X	X	X	X	7.7	X	X	X	X	7.7
	DO (mg/L)	10.5	6.9	7.5	6.6	5.9	5.1	7.5	6.9	4.0	5.3	5.3
	Conductivity	430	X	X	X	X	370	X	X	X	X	370
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19

Comments:

Review: ______ Date: 12/10/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000011

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 3633 Test Starts 10/9/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12614	T (ºC)	23.0	21.6	21.7	21.4	21.2	23.2	23.1	23.2	23.3	23.3	23.1
	pH	7.9	X	X	X	X	7.6	X	X	X	X	7.7
	DO (mg/L)	6.6	7.1	7.5	7.1	5.5	~~5.7~~ 4.1 JM	6.8	6.6	4.1	4.7	5.3
	Conductivity	400	X	X	X	X	385	X	X	X	X	360
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12622	T (ºC)	~~23.0~~ 22.8	21.7	21.5	21.3	21.2	23.5	23.2	23.3	23.5	23.3	23.3
	pH	7.6	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	7.6	7.5	7.8	7.0	7.1	5.2	7.2	6.9	5.3	6.2	6.0
	Conductivity	430	X	X	X	X	390	X	X	X	X	360
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12638	T (ºC)	23.0	21.6	21.6	21.5	21.3	23.4	23.0	23.4	23.4	23.4	22.6
	pH	7.9	X	X	X	X	7.7	X	X	X	X	7.6
	DO (mg/L)	6.7	7.1	7.4	7.0	6.1	4.8	7.0	6.6	4.7	4.2	5.3
	Conductivity	400	X	X	X	X	375	X	X	X	X	360
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/9 [illegible]	10/10 JG	10/11 JG	10/12 JG	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JM	10/18 W	10/19 W

Comments: Test Start 10/9/99 1700 – 2130 J

000012

Review: J Date: 12/10/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 / 3633 Test Starts 10/9/99

Sample	Parameter	Day 0	1	2	3	4	5	6	7	8	9	10
12639	T (°C)	~~23~~ 23.0	21.6	21.7	21.6	21.2	23.4	23.3	23.2	23.3	23.3	22.7
	pH	7.7	X	X	X	X	7.5	X	X	X	X	7.5
	DO (mg/L)	5.8	6.2	6.5	6.4	5.7	4.6	6.8	6.6	4.7	5.2	4.7
	Conductivity	380	X	X	X	X	360	X	X	X	X	370
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12640	T (°C)	23.1	22.0	21.6	21.5	21.1	23.3	23.2	23.2	23.3	23.3	22.7
	pH	~~8~~ 7.6	X	X	X	X	7.6	X	X	X	X	7.5
	DO (mg/L)	6.3	6.3	7.0	6.5	5.4	4.2	6.7	6.4	4.5	5.1	5.0
	Conductivity	380	X	X	X	X	~~240~~ JM 370	X	X	X	X	350
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12641	T (°C)	22.7	21.8	21.7	21.3	21.2	23.2	23.1	23.2	23.4	23.3	22.9
	pH	7.5	X	X	X	X	7.5	X	X	X	X	7.4
	DO (mg/L)	5.3	~~6~~ JG 5.6	6.5	6.0	4.8	4.5	6.4	6.3	4.5	5.3	~~4~~ 5.0
	Conductivity	420	X	X	X	X	310	X	X	X	X	350
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/9 JG	10/10 JG	10/11 JG	10/12 JG	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JM	10/18 W	10/19

Comments:

Review: J Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000043

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3641
	Test Start: October 10, 1999	Test End: October 20, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12664	A	0	JG	—	—	0	—	—	—
	B	7	TM	—	—	7	7	35.61	53.98
	C	6	LS	—	—	6	6	~~40.19~~ 40.00	~~43.19~~ 56.46
	D	0	JG	—	—	0	—	—	—
	E	1	RB	—	—	1	1	~~40.00~~ 40.14	~~56.46~~ 43.19
	F	0	JG	—	—	0	—	—	—
	G	0	RB	—	—	0	—	—	—
	H	0	TM	—	—	0	—	—	—

Acute only

① correc[ted] TM 11/10

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12665	A	9	RB	—	—	9	9	37.51	56.22
	B	8	RB	—	—	8	8	37.80	59.66
	C	8	TM	—	—	8	8	32.59	54.27
	D	4	JG	—	—	4	4	35.21	57.61
	E +1 dead	8	TM	—	—	8	8	35.84	52.66
	F	4	JG	—	—	4	4	42.47	54.17
	G	2	TM	—	—	2	2	37.61	42.38
	H	1	LS	—	—	1	1	36.05	38.61

To chronic

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12666	A	1	LS	—	—	1	1	36.63	37.52
	B	4	TM	—	—	4	4	41.08	46.96
lots of oligs	C	1	RB	—	—	1	1	37.66	37.81
	D	3	LS	—	—	3	1 ①	40.29	40.50
	E	1	TM	—	—	1	1	39.29	39.34
2 chironomids of another sp. present	F	0	LS	—	—	0	—	—	—
	G	0	RB	—	—	0	—	—	—
	H	0	TM	—	—	~~TM~~ 0	—	—	—

Acute only

① only 1 present in vial JM 11/9

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12671	A	0	JG	—	—	0	—	—	—
	B	0	JG	—	—	0	—	—	—
	C	4	LS	—	—	4	4	46.24	55.53
	D	0	TM	—	—	0	—	—	—
	E	1	JG	—	—	1	1	44.61	47.60
	F 1 dead	3	RB	—	—	3	3	46.30	55.50
	G	1	TM	—	—	1	1	40.12	43.01
	H	0	JG	—	—	0	—	—	—

Acute only

Balance QC: Initial (20 mg = 20.01)	Final (20 mg = 20.01)	Balance Asset #: 0708		
Date/time In 11/9 14:00	Temp(°C) 91°C	Init. TM	Date/time out 11/10 16:30 Temp(°C) 87°C	Init. [illegible]
Comments:		19.97 / 19.97		

Reviewer: J Date: 12/10/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000014

Midge (*Chironomus tentans*) Day 10 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99031 Dead Creek	BTR: 3641
	Test Start: October 10, 1999	Test End: October 20, 1999

Sample	Repl.	# Alive	Init.	Repick #	Repick Init.	Total Surv	# Weighed	Init Pan Wt.	Total Dry Wt.
12668	A	10	TM	—	—	10	0 ①	37.31	—
	B	10	LS	—	—	10	0 ①	39.88	—
	C	10	TM	—	—	10	10	36.90	57.53
	D	10	JG	—	—	10	10	38.94	64.79
	E	10	JG	—	—	10	10	40.44	57.73
	F	10	RB	—	—	10	10	36.10	56.71
	G	10	RB	—	—	10	10	43.85	60.76
	H	10	TM	—	—	10	10	36.95	59.57
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								
	A								
	B								
	C								
	D								
	E								
	F								
	G								
	H								

① Not preserved unable to weigh TM 11/

To Chronic

Balance QC: Initial (20 mg = 20.0) Final (20 mg = 20.0) Balance Asset #:

Date/time In Temp(°C) Init. Date/time out Temp(°C) Init.

Comments:

Reviewer [signature] Date 12/10/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Chironomus tentans Head Capsule Width

Culture ID: 9/30, 10/1 Age (d) of larvae: 9-10 days

Magnification: 32 Ocular micrometer calibration: 35 micrometer units = 1 mm
Microscope Asset #: 2929

Calculation of head capsule width:
head capsule width (micrometer units) / micrometer calibration units

Organism Number	Head Capsule Width (micrometer units)	Head Capsule Width (mm)
1	6	0.17
2	7	0.20
3	8	0.23
4	7	0.20
5	8	0.23
6	7	0.20
7	8	0.23
8	14	0.40
9	8	0.23
10	14	0.40
11	14	0.40
12	14	0.40
13	7	0.20
14	7	0.20
15	7	0.20
16	6	0.17
17	-	-
18	-	-
19	-	-
20	-	-
Initials: JWW	Larval heads were severed and mounted on a slide for measurement.	
Date: 12/10/99	Subset of larvae used to start Samples 12664, 12665, 12666, 12671, 12668 on 10/10/99.	

Reviewer: jww Date: 12/10/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/27 ; Larval Hatch Date:	Culture ID: 9/30
Culture Source (flies): Aquatec ; No. Egg Cases: 1	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body castes.

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
9/30	0					Sel		[illegible] → small box	[illegible]
10/1	1					TC/1.0		tubes visible	JG
10/2	2					TC/1.0		added fine sand	JG
10/3	3					TC/1.0			JG
10/4	4					TC/[illegible]			JG
10/5	5					TC [illegible] TC			JG
10/6	6	22.8				TC	✓		[illegible]
10/7	7					TC			TM
10/8	8					TC	✓	Transfer to large box	TM
10/9	9					TC			JG
10/10	10	22.0				TC		TEST START 10/10/90 [illegible]	TM
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
	25								

Chironomus tentans Culture and Pre-test Environmental Conditions Data

Egg Deposit Date: 9/29	Larval Hatch Date: 10/1	Culture ID: ~~10/2~~ 10/1
Culture Source (flies): Aquatec	No. Egg Cases: 4	

Instructions: Isolate egg cases in petri dish with sediment recon. water. Hold in petri dish up to two days or until larval hatching begins. Add mono-layer of *Selenastrum* prior to hatching. Transfer egg cases with hatching larvae to culture box with mono-layer of fine sand, water, and *Selenastrum*. Feed daily increasing amounts of Cerophyll/Tetrafin slurry to match consumption rates (food should not accumulate). Measure water chemistry / change 80% of water weekly. Measure temperature daily in one representative culture. Split cultures if needed to accomodate larval growth. When emergence occurs, remove flies daily to mating flask or disposal flask. Remove discarded body castes.

Date	Day	Temp	pH	DO	Cond	Fed	WC	Observations	Init.
10/1	0					Sel		hatching	JG
10/2	1					TC liq.			JG
10/3	2					TC liq		added fine sand	JG
10/4	3					TC liq.			JG
	4								
10/6	5					TC		Many tubes	J
10/7	6					TC			TM
10/8	7					TC			TM
10/9	8					TC			JG
10/10	9	23.3				TC		Test starts 10/10/99	TM
10/11	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	21								
	22								
	23								
	24								
	25								

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Starts 10/10/99

Sample	Parameter	Day of Analysis +3643										
		0	1	2	3	4	5	6	7	8	9	10
12664	T (°C)	22.8	21.8	22.7	22.6	22.4	22.7	22.4	22.7	22.4	22.7	22.7
	pH	8.0	X	X	X	X	7.9	X	X	X	X	7.7
	DO (mg/L)	7.4	6.7	6.2	6.1	6.0	7.2	7.3	5.8	6.4	6.6	6.8
	Conductivity	390	X	X	X	X	370	X	X	X	X	380
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12665	T (°C)	22.6	21.7	22.6	22.5	22.4	22.5	22.5	23.0	22.2	22.7	22.7
	pH	7.7	X	X	X	X	7.8	X JG	X	X	X	7.7
	DO (mg/L)	6.4	6.1	5.6	5.5	JM 5.4	6.4	7.66	5.2	6.7	6.1	5.7
	Conductivity	410	X	X	X	X	360	X	X	X	X	360
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12666	T (°C)	22.5	21.6	22.5	22.3	22.3	22.4	22.3	23.0	22.2	22.7	22.3
	pH	7.5	X	X	X	X	7.6	X	X	X	X	7.5
	DO (mg/L)	5.0	4.6	4.3	4.1	3.8	5.6	6.3	3.2	6.3	6.0	5.7
	Conductivity	420	X	X	X	X	350	X	X	X	X	380
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	Init./Date (1999):	10/10 JG	10/11 JG	10/12 JG	10/13 JM	10/14 JM	10/15 JG	10/16 JG	10/17 JM	10/18 W	10/19 [illegible]	10/20

Comments: Test START 10/10/99 - ~~1800~~ 1700 - 1800

* Gave 12666 an extra manual renewal 10/14 10:00 JM

Review: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Acute Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Starts 10/10/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12667 JG 71	T (ºC)	22.8	21.6	22.4	22.4	22.4	22.3	22.7	23.1	22.7	23.1	22.7
	pH	7.6	X	X	X	X	7.8	X	X	X	X	7.7
	DO (mg/L)	~~7.4~~ 6.2 JG	6.0	~~5~~ 6.1 JG	5.2	4.7	~~7~~ 6.8 JG	6.8	6.1	6.2	5.0	6.5
	Conductivity	~~420~~ 350 JG	X	X	X	X	360 JG	X	X	X	X	370
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
12668	T (ºC)	22.7	21.5	22.4	22.4	22.4	22.4	22.7	23.2	22.7	22.9	22.9
	pH	7.7	X	X	X	X	7.8	X	X	X	X	7.7
	DO (mg/L)	~~6.2~~ 7.4 JG	6.9	5.8	5.8	5.9	6.8	7.3	5.9	6.7	6.4	6.6
	Conductivity	420	X	X	X	X	380	X	X	X	X	370
	Ammonia, alk/hardness Sulfide	✓	X	X	X	X	X	X	X	X	X	✓
	T (ºC)											
	pH		X	X	X	X		X	X	X	X	
	DO (mg/L)											
	Conductivity		X	X	X	X		X	X	X	X	
	Ammonia, alk/hardness Sulfide		X	X	X	X	X	X	X	X	X	
	Init./Date (1999):	10/10 JG	10/11 JG	10/12 JG	10/13 JM	10/14 JM	~~10/15~~ JG	10/16 JG	10/17 JM	10/18 W	10/19 W	10/20 M

Comments:

Review: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000050

ALKALINITY & HARDNESS WORKSHEET

BTR Number	Several	Project #	99033	Analyst	LS
Species	*Chironomus tentans*			Analysis	
Test Facility	Aquatec Biological Sciences South Burlington, Vermont			Date:	10/13/99
Project	Menzie-Cura Dead Creek Acute Tests				

		ALKALINITY				HARDNESS			
Date	Sample Type	Sampl ml	Initial ml	Final ml	Alkalinity (mg/L)	Sample ml	Initial ml	Final ml	Hardness (mg/L)
10/07/99	12546 Day 0	50	12.0	13.5	30.0	50	16.4	23.1	134.0
10/07/99	12547 Day 0	50	13.5	15.3	36.0	50	23.1	28.7	112.0
10/07/99	12548 Day 0	50	15.3	17.0	34.0	50	28.7	34.6	118.0
10/07/99	12549 Day 0	50	17.0	18.7	34.0	50	34.6	40.6	120.0
10/07/99	12550 Day 0	50	18.7	20.4	34.0	50	40.6	46.5	118.0
10/07/99	12551 Day 0	25	20.4	22.2	72.0	50	0.6	6.3	114.0
10/07/99	12552 Day 0	50	22.2	24.0	36.0	50	6.3	12.7	128.0
10/08/99	12589 Day 0	50	24.0	25.4	28.0	50	12.7	19.0	126.0
10/08/99	12590 Day 0	50	25.4	26.9	30.0	50	19.0	25.5	130.0
10/08/99	12591 Day 0	50	26.9	28.3	28.0	50	25.5	49.3	476.0
10/08/99	12592 Day 0	50	28.3	29.9	32.0	50	1.0	7.3	126.0
10/08/99	12593 Day 0	50	29.9	31.3	28.0	50	7.3	13.2	118.0
10/08/99	12609 Day 0	50	31.3	33.0	34.0	50	13.2	20.0	136.0
10/08/99	12610 Day 0	50	33.0	34.4	28.0	50	20.0	27.8	156.0
10/08/99	12615 Day 0	50	34.4	35.9	30.0	50	27.8	34.0	124.0
10/09/99	12611 Day 0	50	37.8	39.8	40.0	50	30.2	37.4	144.0
10/09/99	12612 Day 0	50	39.8	41.8	40.0	50	37.4	45.0	152.0
10/09/99	12613 Day 0	50	41.8	43.7	38.0	50	0.8	9.0	164.0
10/09/99	12614 Day 0	50	0.4	2.5	42.0	50	9.0	16.5	150.0
10/09/99	12622 Day 0	50	2.5	4.4	38.0	50	16.5	24.1	152.0
10/09/99	12638 Day 0	50	4.4	6.6	44.0	50	24.1	32.2	162.0
10/09/99	12639 Day 0	50	6.6	8.3	34.0	50	32.2	38.6	128.0
10/09/99	12640 Day 0	50	8.3	10.0	34.0	50	38.6	46.1	150.0
10/09/99	12641 Day 0	50	10.0	12.0	40.0	30	0.6	5.2	153.3
10/10/99	12664 Day 0	50	35.9	37.2	26.0	50	34.0	42.0	160.0
10/10/99	12665 Day 0	50	37.2	39.2	40.0	50	0.8	7.9	142.0
10/10/99	12666 Day 0	50	39.2	41.5	46.0	50	7.9	16.0	162.0
10/10/99	12668 Day 0	50	41.5	43.4	38.0	50	16.0	23.5	150.0
10/10/99	12671 Day 0	50	43.4	44.9	30.0	50	23.5	30.2	134.0

ALKALINITY & HARDNESS WORKSHEET

BTR Number: Several Project #: 99033 Analyst: LS

Species: *Chironomus tentans* Analysis

Test Facility: Aquatec Biological Sciences, South Burlington, Vermont Dates: 11/21/99 12/2/99

Project: Menzie-Cura Dead Creek Acute Tests 12/7/99

		ALKALINITY				HARDNESS			
Date	Sample Type	Sample ml	Initial ml	Final ml	Alkalinity (mg/L)	Sample ml	Initial ml	Final ml	Hardness (mg/L)
10/17/99	12546 Day 10 CT	50	33.4	35.3	38.0	50	8.1	15.8	154.0
10/17/99	12547 Day 10 CT	50	35.3	37.7	48.0	50	15.8	23.2	148.0
10/17/99	12548 Day 10 CT	50	37.7	39.4	34.0	50	23.2	29.9	134.0
10/17/99	12549 Day 10 CT	50	39.4	41.1	34.0	50	29.9	38.0	162.0
10/17/99	12550 Day 10 CT	50	41.1	42.9	36.0	50	38.0	45.8	156.0
10/17/99	12551 Day 10 CT	50	42.9	44.7	36.0	50	0.1	8.1	160.0
10/17/99	12552 Day 10 CT	50	44.7	46.5	36.0	50	8.1	15.7	152.0
10/18/99	12589 Day 10 CT	50	15.9	17.9	40.0	50	19.6	28.4	176.0
10/18/99	12590 Day 10 CT	50	17.9	19.9	40.0	50	28.4	36.9	170.0
10/18/99	12591 Day 10 CT	50	19.9	21.9	40.0	50	36.9	45.4	170.0
10/18/99	12592 Day 10 CT	50	21.9	23.8	38.0	50	0.1	8.6	170.0
10/18/99	12593 Day 10 CT	50	23.8	25.7	38.0	50	8.6	17.8	184.0
10/18/99	12609 Day 10 CT	50	25.7	28.1	48.0	50	17.8	25.4	152.0
10/18/99	12610 Day 10 CT	50	28.1	30.0	38.0	50	25.4	33.8	168.0
10/18/99	12615 Day 10 CT	50	30.0	31.3	26.0	50	33.8	41.7	158.0
10/19/99	12611 Day 10 CT	50	43.0	44.6	32.0	50	6.9	14.0	142.0
10/19/99	12612 Day 10 CT	50	44.6	46.4	36.0	50	14.0	20.4	128.0
10/19/99	12613 Day 10 CT	50	46.4	48.2	36.0	50	20.4	26.8	128.0
10/19/99	12614 Day 10 CT	50	0.3	2.2	38.0	50	26.8	33.2	128.0
10/19/99	12622 Day 10 CT	50	2.2	3.9	34.0	50	33.2	39.8	132.0
10/19/99	12638 Day 10 CT	50	3.9	5.5	32.0	50	39.8	46.5	134.0
10/19/99	12639 Day 10 CT	50	5.5	7.4	38.0	50	0.1	6.9	136.0
10/19/99	12640 Day 10 CT	50	7.4	9.2	36.0	50	6.9	12.9	120.0
10/19/99	12641 Day 10 CT	50	9.2	11.4	44.0	50	12.9	19.1	124.0
10/20/99	12664 Day 10 CT	50	42.2	44.2	40.0	50	15.0	22.5	150.0
10/20/99	12665 Day 10 CT	50	44.2	46.0	36.0	50	22.5	29.5	140.0
10/20/99	12666 Day 10 CT	50	46.0	47.9	38.0	50	29.5	36.9	148.0
10/20/99	12668 Day 10 CT	50	0.2	1.8	32.0	50	36.9	42.4	110.0
10/20/99	12671 Day 10 CT	50	1.8	3.9	42.0	50	0.4	7.9	150.0

Alkalinity and Hardness Analysis

Client: Menzie-Cura	**Project:** 99033	**BTR:** Several	
Sample Description:	Day 0	HA / CT	

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
	121611	10/9	50ml	37.8	39.8	10/13 [illegible]	50ml	30.2	37.4	10/13 [illegible]	11/23 RB
	121612	10/9	50	39.8	41.8	10/13 [illegible]		37.4	45.0		
	121613	10/9	50	41.8	43.7	10/13 [illegible]		0.8	9.0		
	121614	10/9	50	0.4	2.5	10/13 [illegible]		9.0	16.5		
	121622	10/9	50	2.5	4.4	10/13 [illegible]		16.5	24.1		
	121638	10/9	50	4.4	6.6	10/13 [illegible]		24.1	32.2		
	121639	10/9	50	6.6	8.3	10/13 [illegible]		32.2	38.6		
	121640	10/9	50	8.3	10.0	10/13 [illegible]		38.6	46.1		
	121641	10/9	50	10.0	12.0	10/13 [illegible]	30	0.6	5.2		
23											
12546	10546	10/7	50	12.0	13.5	10/13 [illegible]	50ml	16.4	23.1	10/13 [illegible]	11/23 RB
12547	10547	10/7	50	13.5	15.3	10/13 [illegible]		23.1	28.7		
12548	10548	10/7	50	15.3	17.0	10/13 [illegible]		28.7	34.6		
12549	10549	10/7	50	17.0	18.7	10/13 [illegible]		34.6	40.6		
12550	10550	10/7	50	18.7	20.4	10/13 [illegible]		40.6	46.5		
12551	10551	10/7	50	20.4	22.2	10/13 [illegible]		0.6	6.3		
12552	10552	10/7	50	22.2	24.0	10/13 [illegible]		6.3	12.7		
12589	10589	10/8	50	24.0	25.4	10/13 [illegible]		12.7	19.0		
12590	10590	10/8	50	25.4	26.9	10/13 [illegible]		19.0	25.5		
12591	10591	10/8	50	26.9	28.3	10/13 [illegible]		25.5	49.3		
12592	10592	10/8	50	28.3	29.9	10/13 [illegible]		1.0	7.3		
12593	10593	10/8	50	29.9	31.3	10/13 [illegible]		7.3	13.2		
12609	10609	10/8	50	31.3	33.0	10/13 [illegible]		13.2	20.0		
12610	10610	10/8	50	33.0	34.4	10/13 [illegible]		20.0	27.8		
12615	10615	10/8	50	34.4	35.9	10/13 [illegible]		27.8	34.0		
	121664	10/10	50	35.9	37.2	10/13 [illegible]		34.0	42.0		
	121665	10/10	50	37.2	39.2	10/13 [illegible]		0.8	7.9		
	121666	10/10	50	39.2	41.5	10/13 [illegible]		7.9	16.0		
	121668	10/10	50	41.5	43.4	10/13 [illegible]		16.0	23.5		
	121671	10/10	50	43.4	44.9	10/13 [illegible]		23.5	30.2		

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project:	BTR: Several
Sample Description: Day 10 Ct. 10/17		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12546	10/17	50ml	33.4	35.3	12/2 [illegible]	50ml	8.1	15.8	12/7 [illegible]	
47			35.3	37.7			15.8	23.2		
48			37.7	39.4			23.2	29.9		
49			39.4	41.1			29.9	38.0		
50			41.1	42.9			38.0	45.8		
51			42.9	44.7			0.1	8.1		
52			44.7	46.5			8.1	15.7		

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project:	BTR: Severn
Sample Description: C.T. + H.a. day 10 10/18		

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
Ct-	12589	10/18	50ml	15.9	17.9	12/2 YS	50ml	19.6	28.4	[illegible] YS	
	90			17.9	19.9			28.4	36.9		
	91			19.9	21.9			36.9	45.4		
	92			21.9	23.8			0.1	8.6		
	93			23.8	25.7			8.6	17.8		
	121609			25.7	28.1			17.8	25.4		
	10			28.1	30.0			25.4	33.8		
Ct-	121615			30.0	31.3			33.8	41.7		
H.a	121615	10/18	50ml	31.3	33.4	12/2 YS	50ml	0.2	8.1	[illegible] YS	

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: Day 10 H.a. + C.t		

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
H.a.	12611	10/19	50ml	27.0	28.8	11/21 YS	50ml	36.9	44.2	11/21 YS	
	12612			28.8	30.5			0.3	7.6		
	613			30.5	32.4			7.6	14.5		
	614			32.4	34.1			14.5	21.2		
	622			34.1	35.6			21.2	27.8		
	638			35.6	37.5			27.8	34.6		
	639			37.5	39.2			34.6	41.4		
	640			39.2	41.0			41.4	48.4		
	641			41.0	43.0			0.0	6.9		
C.t.	12611	10/19	50ml	43.0	44.6	11/21 YS	50ml	6.9	14.0	11/21 YS	11/23 RB
	612			44.6	46.4			14.0	20.4		
	613			46.4	48.2			20.4	26.8		
	614			0.3	2.2			26.8	33.2		
	622			2.2	3.9			33.2	39.8		
	638			3.9	5.5			39.8	46.5		
	639			5.5	7.4			0.1	6.9		
	640			7.4	9.2			6.9	12.9		
	641			9.2	11.4			12.9	19.1		

Alkalinity and Hardness Analysis

Client: Menzie-Cura Project: BTR: Several

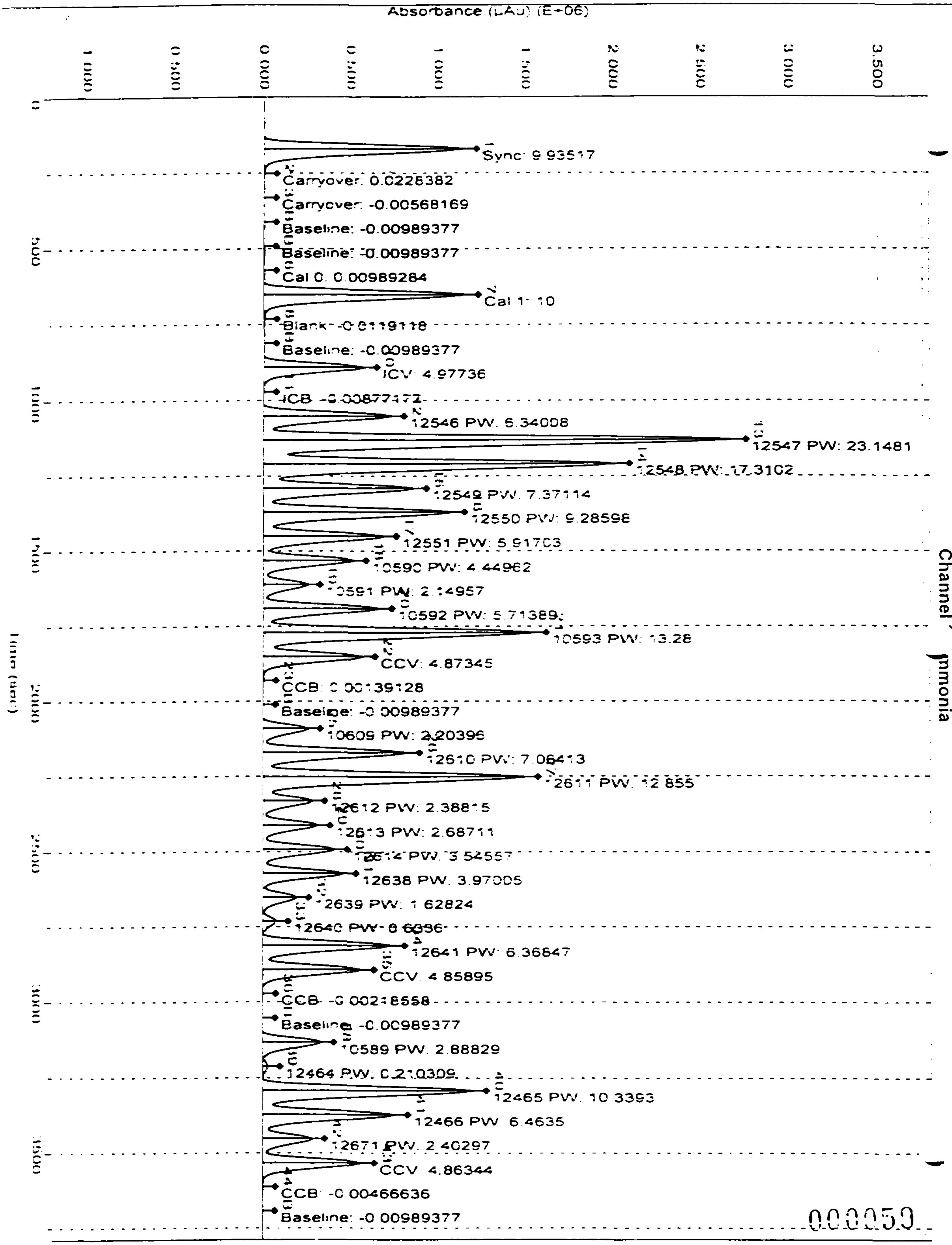
Sample Description: Day 10 H.a. + C.t. 10/20

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/Init.	Data entered Init.
121064	10/20	50ml	32.1	34.0	12/2 YS	50ml	24.1	31.8	12/7 YS ~~50ml~~	
65			34.0	36.3			31.8	39.8		
66			36.3	38.4			39.8	46.5		
68			38.4	40.1			0.2	7.4		
71			40.1	42.2			7.4	15.0		
121064	10/20	50ml	42.2	44.2	12/2 YS	50ml	15.0	22.5	12/7 YS	
65			44.2	46.0			22.5	29.5		
66			46.0	47.9			29.5	36.9		
68			0.2	1.8			36.9	42.4		
71			1.8	3.9			0.4	7.9		

H.a. (rows 121064–71, first group)

C.t. (rows 121064–71, second group)

Results of Ammonia Analyses (Total, mg/L) *Chironomus tentans* / Dead Creek / Project 99033			
Sample ID	Porewater	Day 0 Overlying Water	Day 10 *Chironomus tentans*
12546	6.3	1.1	1.1
12547	23.1	4.5	2.6
12548	17.3	3.5	4.1
12549	7.4	1.6	1.0
12550	9.3	2.8	1.6
12551	5.9	1.7	1.9
12552	-	<0.5	0.5
12589	2.9	<0.5	1.3
12590	4.4	0.5	0.9
12591	2.1	<0.5	<0.5
12592	5.7	0.9	0.5
12593	13.3	2.1	<0.5
12609	2.2	<0.5	1.4
12610	7.1	0.9	0.7
12611	12.9	4.3	0.8
12612	2.4	0.7	<0.5
12613	2.7	0.9	0.7
12614	3.5	1.2	1.1
12615	-	<0.5	0.6
12622	-	<0.5	0.7
12638	4.0	1.2	0.9
12639	1.6	0.8	<0.5
12640	0.6	0.6	<0.5
12641	6.4	2.7	1.7
12664	<0.5	<0.5	<0.5
12665	10.3	3.4	1.3
12666	6.5	2.2	0.9
12668	-	<0.5	0.6
12671	2.4	0.7	<0.5



Absorbance (uAU) (E+06)
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
Sync: 9.93517
Carryover: 0.0228382
Carryover: -0.00568169
Baseline: -0.00989377
Baseline: -0.00989377
Cal 0: 0.00989284
Cal 1: 10
Baseline: -0.00989377
ICV: 4.97736
12546 PW: 6.34008
12547 PW: 23.1481
12549 PW: 7.37114
12550 PW: 9.28598
12551 PW: 5.91703
10590 PW: 4.44962
10592 PW: 5.71389
10593 PW: 13.28
CCV: 4.87345
Baseline: -0.00989377
10609 PW: 2.20396
12610 PW: 7.06413
12612 PW: 2.38815
12638 PW: 3.97005
2639 PW: 1.62824
12641 PW: 6.36847
CCV: 4.85895
Baseline: -0.00989377
10589 PW: 2.88829
12465 PW: 10.3393
12466 PW 6.4635
CCV 4.86344
CCB: -0.00466636
Baseline: -0.00989377
Channel
mmonia

000059

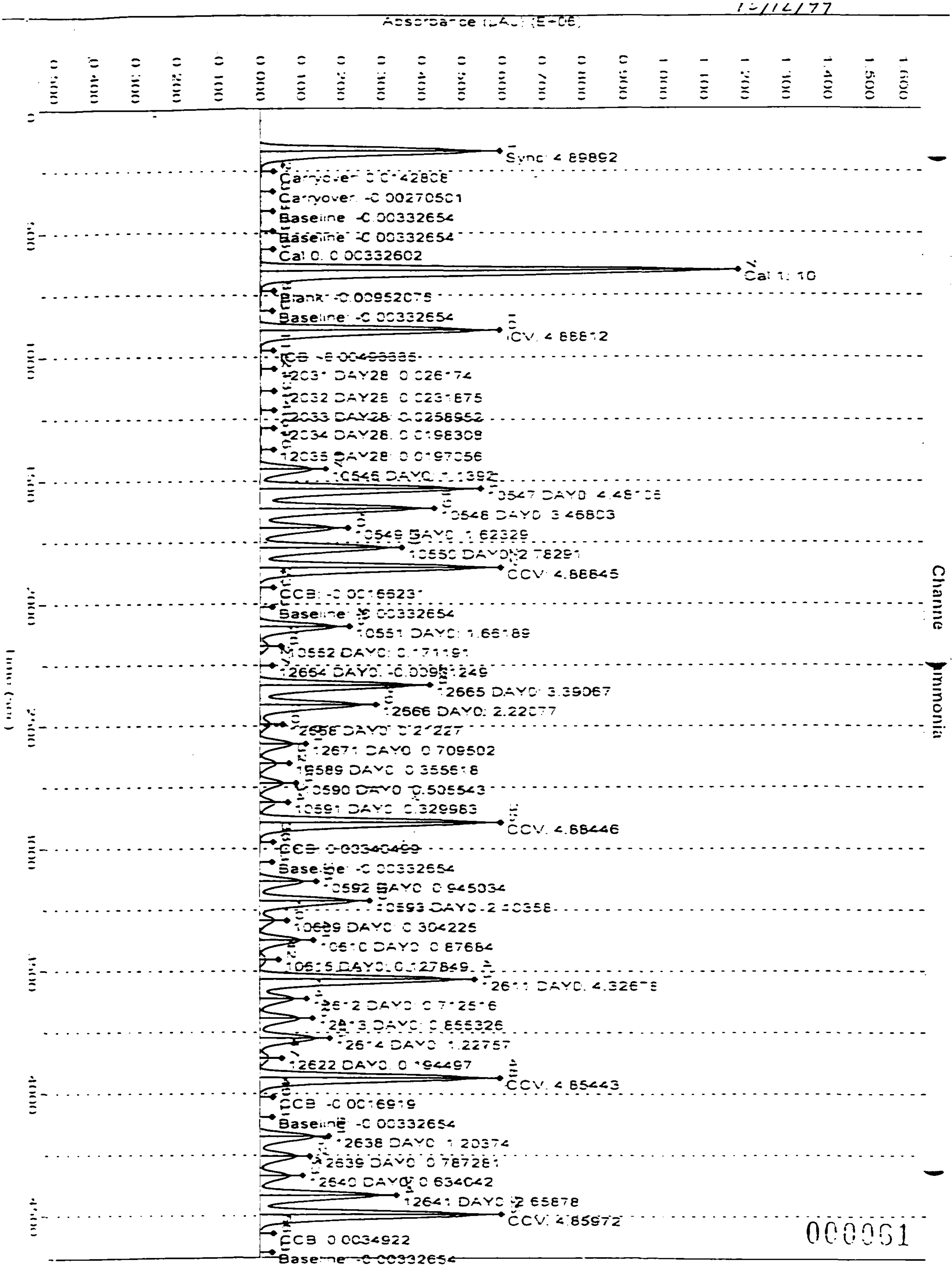
Peak Table: ammonia

File name: C:\FLOW_4\101299E.RST
Date: October 12, 1999
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	-1	1	1150681	9.935171
2	0	Carryover	CO	1	1	3787	0.022838
3	0	Carryover	CO	1	1	487	-0.005682
B	0	Baseline	RB	1	1	0	-0.009894
B	0	Baseline	RB	1	1	0	-0.009894
6	1	Cal 0	C	1	1	2289	0.009893
7	2	Cal 1	C	1	1	1158182	10.000000
8	0	Blank	U	1	1	-233	-0.011912
B	0	Baseline	RB	1	1	0	-0.009894
10	3	ICV	U	1	1	577044	4.977356
11	1	ICB	U	1	1	130	-0.008772
12	31	12546 PW	U	1	1	734716	6.340084
13	32	12547 PW	U	1	1	2679467	23.148100
14	33	12548 PW	U	1	1	2004003	17.310225
15	34	12549 PW	U	1	1	854013	7.371138
16	35	12550 PW	U	1	1	1075568	9.285980
17	36	12551 PW	U	1	1	685767	5.917027
18	37	10590 PW	U	1	1	515983	4.449624
19	38	10591 PW	U	1	1	249859	2.149575
20	39	10592 PW	U	1	1	662263	5.713890
21	40	10593 PW	U	1	1	1537687	13.279972
22	3	CCV	U	1	1	565021	4.873451
23	1	CCB	U	1	1	1306	0.001391
[illegible]	0	Baseline	RB	1	1	0	-0.009894
25	41	10609 PW	U	1	1	256151	2.203963
26	42	12610 PW	U	1	1	820805	7.084130
27	43	12611 PW	U	1	1	1488515	12.854989
28	44	12612 PW	U	1	1	277463	2.388149
29	45	12613 PW	U	1	1	312054	2.687114
30	46	12614 PW	U	1	1	411381	3.545574
31	47	12638 PW	U	1	1	460495	3.970054
32	48	12639 PW	U	1	1	189538	1.628238
33	49	12640 PW	U	1	1	74455	0.633600
34	50	12641 PW	U	1	1	738001	6.368472
35	3	CCV	U	1	1	563344	4.858951
36	1	CCB	U	1	1	892	-0.002186
B	0	Baseline	RB	1	1	0	-0.009894
38	51	10589 PW	U	1	1	335331	2.888294
39	52	12464 PW	U	1	1	25478	0.210309
40	53	12465 PW	U	1	1	1197437	10.339272
41	54	12466 PW	U	1	1	748996	6.463504
42	55	12671 PW	U	1	1	279177	2.402970
43	3	CCV	U	1	1	563863	4.863436
44	1	CCB	U	1	1	605	-0.004666
B	0	Baseline	RB	1	1	0	-0.009894

Peak	Cup	Flags
1	2	
2	0	
3	0	LO
B	0	BL

12/14/97

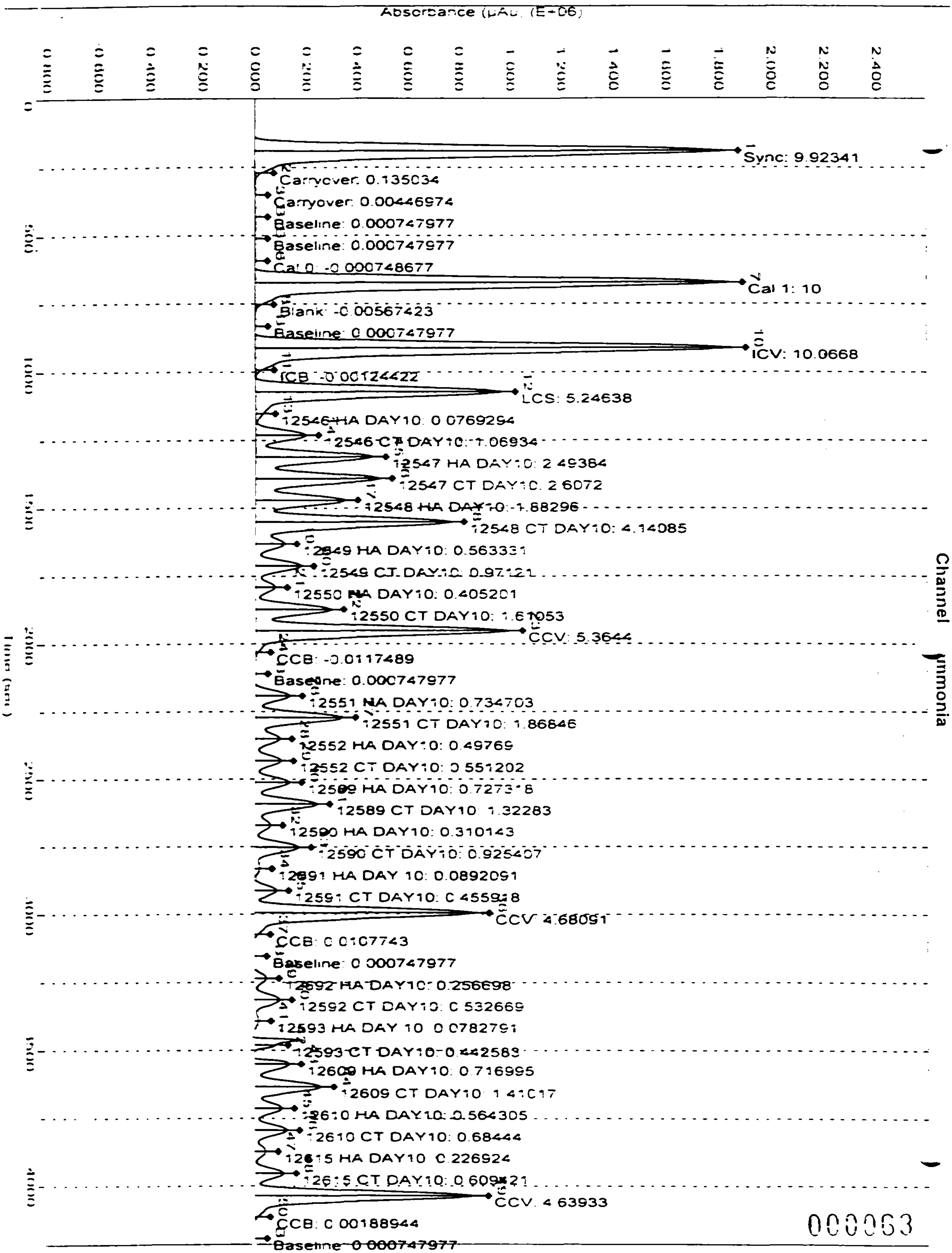


Absorbance (uAU) (E+06)
Time (sec)
Channel Ammonia
Sync 4.89892
Baseline -0.00332654
Baseline -0.00332654
Cal 0: 0.00332602
Cal 1: 10
Baseline -0.00332654
CCV: 4.88812
12031 DAY28: 0.026174
12032 DAY28: 0.0231875
12034 DAY28: 0.0198309
12035 DAY28: 0.0197056
10547 DAY0: 4.48106
10548 DAY0: 3.46803
10549 DAY0: 1.62329
CCV: 4.88845
Baseline -0.00332654
10551 DAY0: 1.66189
10552 DAY0: 0.171191
12665 DAY0: 3.39067
12666 DAY0: 2.22077
12671 DAY0: 0.709502
10589 DAY0: 0.355518
10590 DAY0: 0.505543
10591 DAY0: 0.329983
CCV: 4.88446
Baseline -0.00332654
10592 DAY0: 0.945034
10609 DAY0: 0.304225
10610 DAY0: 0.87664
12611 DAY0: 4.32678
12612 DAY0: 0.712516
12613 DAY0: 0.855326
12614 DAY0: 1.22757
12622 DAY0: 0.194497
CCV: 4.85443
CCB: -0.0016919
Baseline -0.00332654
12638 DAY0: 1.20374
12639 DAY0: 0.787281
12640 DAY0: 0.634042
12641 DAY0: 2.65878
CCV: 4.85972
CCB: 0.0034922
Baseline -0.00332654

Peak Table: ammonia

File name: C:\FLOW_4\101299F.RST
Date: October 12, 1999
Operator: NVW

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	3	Sync	SYNC	1	1	564454	4.898925
2	0	Carryover	CO	1	1	2027	0.014281
3	0	Carryover	CO	1	1	72	-0.002705
B	0	Baseline	RB	1	1	0	-0.003327
B	0	Baseline	RB	1	1	0	-0.003327
6	1	Cal 0	C	1	1	766	0.003326
7	2	Cal 1	C	1	1	1151801	10.000001
8	0	Blank	U	1	1	-713	-0.009521
B	0	Baseline	RB	1	1	0	-0.003327
10	3	ICV	U	1	1	563210	4.888124
11	1	ICB	U	1	1	-185	-0.004933
12	61	12031 DAY28	U	1	1	3397	0.026174
13	62	12032 DAY28	U	1	1	3053	0.023187
14	63	12033 DAY28	U	1	1	3365	0.025895
15	64	12034 DAY28	U	1	1	2666	0.019831
16	65	12035 DAY28	U	1	1	2652	0.019706
17	66	10546 DAY0	U	1	1	131553	1.139205
18	67	10547 DAY0	U	1	1	516340	4.481058
19	68	10548 DAY0	U	1	1	399699	3.468033
20	69	10549 DAY0	U	1	1	187292	1.623291
21	70	10550 DAY0	U	1	1	320812	2.782907
22	3	CCV	U	1	1	563248	4.888451
23	1	CCB	U	1	1	192	-0.001662
	0	Baseline	RB	1	1	0	-0.003327
25	71	10551 DAY0	U	1	1	191736	1.661889
26	72	10552 DAY0	U	1	1	20094	0.171191
27	73	12664 DAY0	U	1	1	-655	-0.009012
28	74	12665 DAY0	U	1	1	390790	3.390665
29	75	12666 DAY0	U	1	1	256086	2.220768
30	76	12668 DAY0	U	1	1	24824	0.212270
31	77	12671 DAY0	U	1	1	82076	0.709502
32	78	10589 DAY0	U	1	1	41329	0.355618
33	79	10590 DAY0	U	1	1	58592	0.505543
34	80	10591 DAY0	U	1	1	38378	0.329983
35	3	CCV	U	1	1	562789	4.884464
36	1	CCB	U	1	1	775	0.003405
B	0	Baseline	RB	1	1	0	-0.003327
38	81	10592 DAY0	U	1	1	109196	0.945034
39	82	10593 DAY0	U	1	1	242593	2.103578
40	83	10609 DAY0	U	1	1	35412	0.304225
41	84	10610 DAY0	U	1	1	101344	0.876840
42	85	10615 DAY0	U	1	1	15104	0.127849
43	86	12611 DAY0	U	1	1	498576	4.326778
44	87	12612 DAY0	U	1	1	82423	0.712516
45	88	12613 DAY0	U	1	1	98867	0.855326
46	89	12614 DAY0	U	1	1	141727	1.227565
47	90	12622 DAY0	U	1	1	22778	0.194497
48	3	CCV	U	1	1	559331	4.854431
49	1	CCB	U	1	1	188	-0.001692
	0	Baseline	RB	1	1	0	-0.003327
51	91	12638 DAY0	U	1	1	138983	1.203735
52	92	12639 DAY0	U	1	1	91032	0.787281
53	93	12640 DAY0	U	1	1	73388	0.634042
54	94	12641 DAY0	U	1	1	306520	2.658779



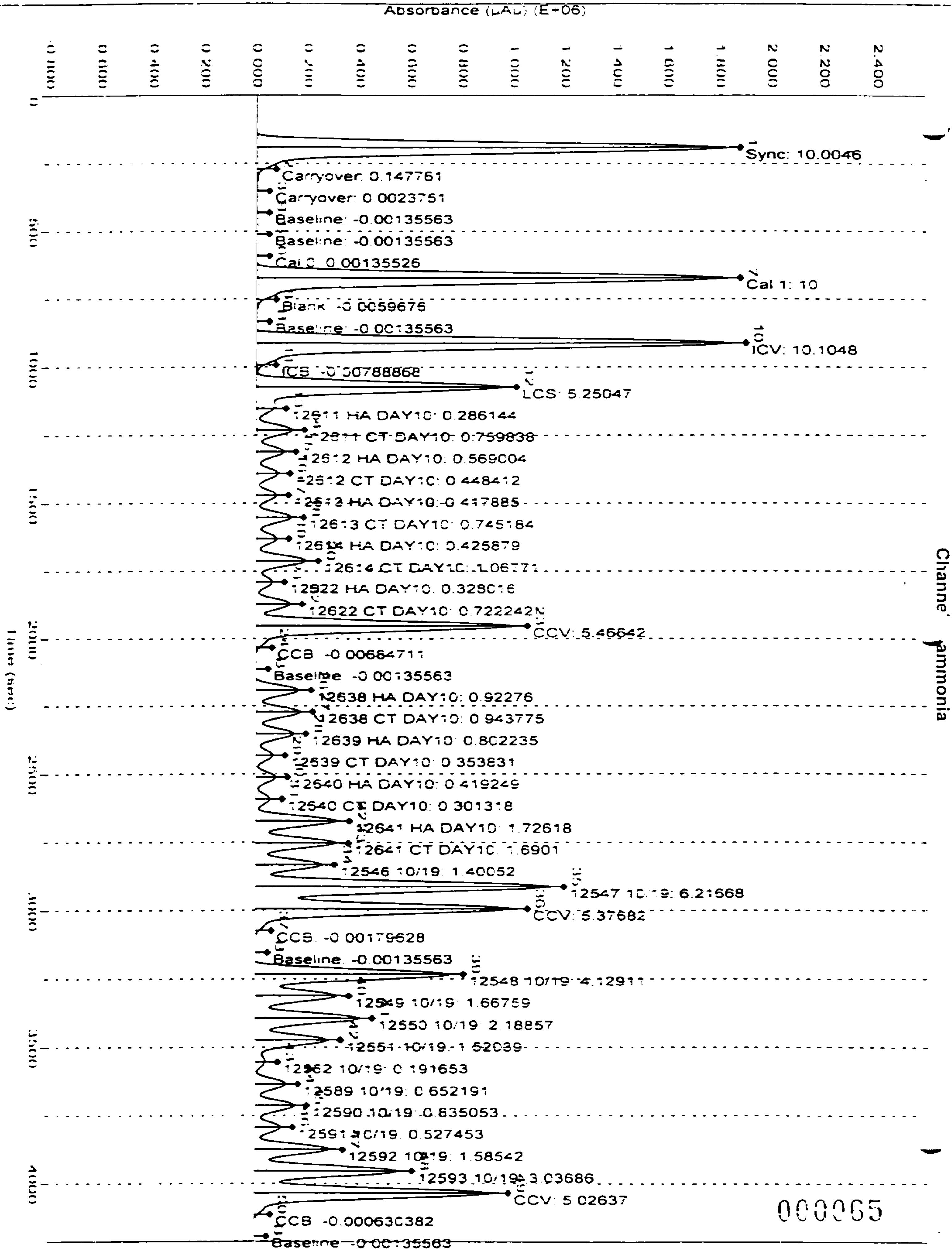
Absorbance (µAu) (E+06)
Time (sec)
Channel Ammonia
Sync: 9.92341
Carryover: 0.135034
Carryover: 0.00446974
Baseline: 0.000747977
Baseline: 0.000747977
Cal 0: -0.000748677
Cal 1: 10
Blank: -0.00567423
Baseline: 0.000747977
ICV: 10.0668
ICB: -0.00124422
LCS: 5.24638
12546 HA DAY10: 0.0769294
12546 CT DAY10: 1.06934
12547 HA DAY10: 2.49364
12547 CT DAY10: 2.6072
12548 HA DAY10: 1.88296
12548 CT DAY10: 4.14085
12549 HA DAY10: 0.563331
12549 CT DAY10: 0.97121
12550 HA DAY10: 0.405201
12550 CT DAY10: 1.61053
CCV: 5.3644
CCB: -0.0117489
Baseline: 0.000747977
12551 HA DAY10: 0.734703
12551 CT DAY10: 1.86846
12552 HA DAY10: 0.49769
12552 CT DAY10: 0.551202
12589 HA DAY10: 0.727318
12589 CT DAY10: 1.32283
12590 HA DAY10: 0.310143
12590 CT DAY10: 0.925407
12591 HA DAY 10: 0.0892091
12591 CT DAY10: 0.455918
CCV: 4.68091
CCB: 0.0107743
Baseline: 0.000747977
12592 HA DAY10: 0.256698
12592 CT DAY10: 0.532669
12593 HA DAY 10: 0.0782791
12593 CT DAY10: 0.442583
12609 HA DAY10: 0.716995
12609 CT DAY10: 1.41017
12610 HA DAY10: 0.564305
12610 CT DAY10: 0.68444
12615 HA DAY10: 0.226924
12615 CT DAY10: 0.609121
CCV: 4.63933
CCB: 0.00188944
Baseline: 0.000747977

000063

Peak Table: ammonia

File name: F:\FLOW_4\102799C.RST
Date: October 2~~8~~, 1999
Operator: LKS 27 J

P[illegible]k	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1826754	9.923410
2	0	Carryover	CO	1	1	24722	0.135034
3	0	Carryover	CO	1	1	685	0.004470
B	0	Baseline	RB	1	1	0	0.000748
B	0	Baseline	RB	1	1	0	0.000748
6	1	Cal 0	C	1	1	-276	-0.000749
7	2	Cal 1	C	1	1	1840854	10.000001
8	0	Blank	U	1	1	-1182	-0.005674
B	0	Baseline	RB	1	1	0	0.000748
10	2	ICV	U	1	1	1853145	10.066763
11	1	ICB	U	1	1	-367	-0.001244
12	3	LCS	U	1	1	965717	5.246381
13	91	12546 HA DAY10	U	1	1	14025	0.076929
14	92	12546 CT DAY10	U	1	1	196727	1.069342
15	93	12547 HA DAY10	U	1	1	458976	2.493840
16	94	12547 CT DAY10	U	1	1	479846	2.607204
17	95	12548 HA DAY10	U	1	1	346513	1.882956
18	96	12548 CT DAY10	U	1	1	762189	4.140845
19	97	12549 HA DAY10	U	1	1	103571	0.563331
20	98	12549 CT DAY10	U	1	1	178661	0.971210
21	99	12550 HA DAY10	U	1	1	74460	0.405201
22	100	12550 CT DAY10	U	1	1	296360	1.610535
2[illegible]	3	CCV	U	1	1	987444	5.364398
[illegible]	1	CCB	U	1	1	-2301	-0.011749
B	0	Baseline	RB	1	1	0	0.000748
26	101	12551 HA DAY10	U	1	1	135120	0.734703
27	102	12551 CT DAY10	U	1	1	343845	1.868462
28	103	12552 HA DAY10	U	1	1	91487	0.497690
29	104	12552 CT DAY10	U	1	1	101338	0.551202
30	105	12589 HA DAY10	U	1	1	133761	0.727318
31	106	12589 CT DAY10	U	1	1	243394	1.322828
32	107	12590 HA DAY10	U	1	1	56959	0.310143
33	108	12590 CT DAY10	U	1	1	170229	0.925407
34	109	12591 HA DAY 10	U	1	1	16286	0.089209
35	110	12591 CT DAY10	U	1	1	83796	0.455918
36	3	CCV	U	1	1	861614	4.680911
37	1	CCB	U	1	1	1846	0.010774
B	0	Baseline	RB	1	1	0	0.000748
39	111	12592 HA DAY10	U	1	1	47120	0.256698
40	112	12592 CT DAY10	U	1	1	97926	0.532669
41	113	12593 HA DAY 10	U	1	1	14273	0.078279
42	114	12593 CT DAY10	U	1	1	81341	0.442583
43	115	12609 HA DAY10	U	1	1	131861	0.716995
44	116	12609 CT DAY10	U	1	1	259474	1.410171
45	117	12610 HA DAY10	U	1	1	103750	0.564305
46	118	12610 CT DAY10	U	1	1	125867	0.684440
47	119	12615 HA DAY10	U	1	1	41639	0.226924
48	120	12615 CT DAY10	U	1	1	112056	0.609421
	3	CCV	U	1	1	853959	4.639331
[illegible]	1	CCB	U	1	1	210	0.001889
B	0	Baseline	RB	1	1	0	0.000748

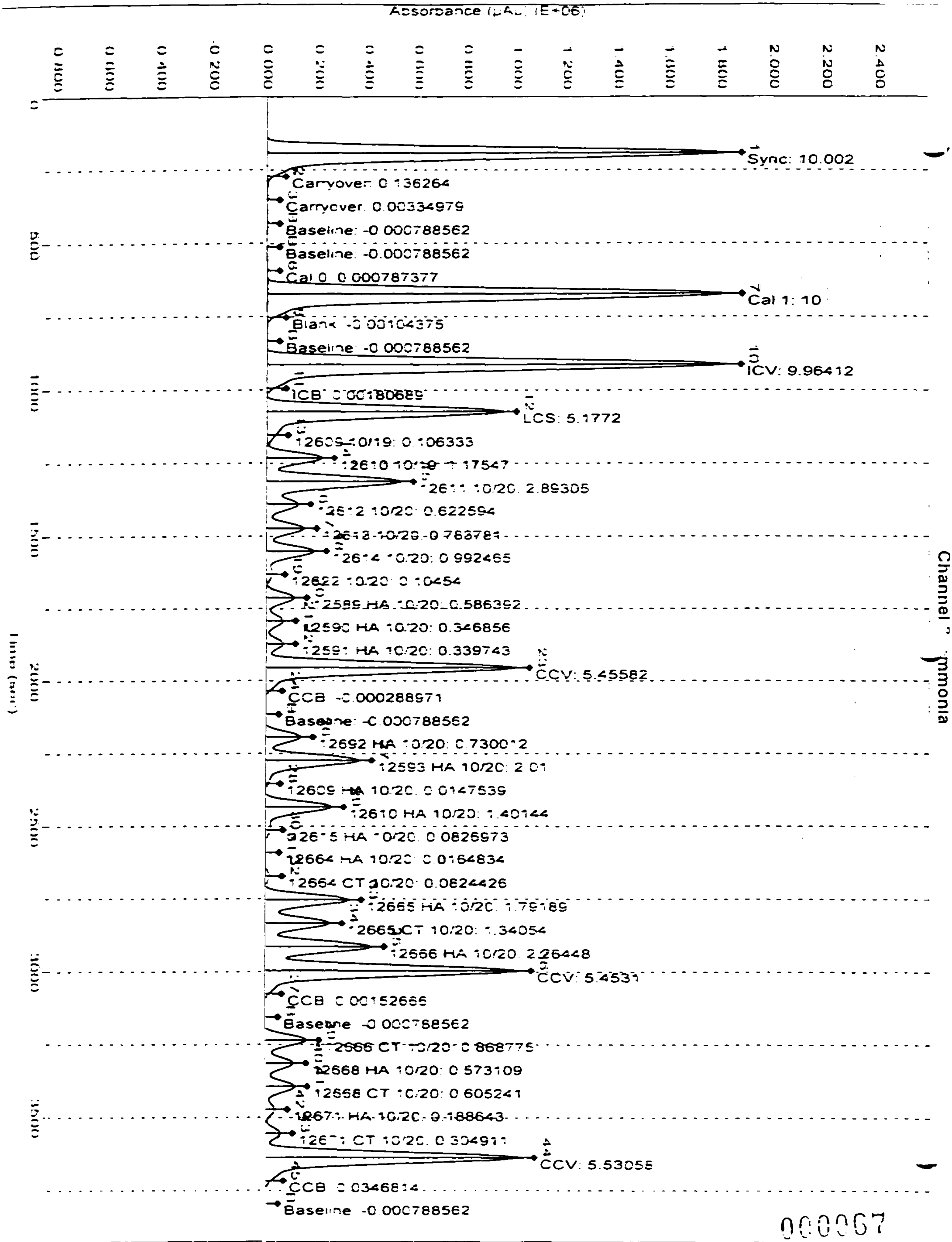


Absorbance (µAU) (E+06)
Time (sec)
Channel ammonia
Sync: 10.0046
Carryover: 0.147761
Carryover: 0.0023751
Baseline: -0.00135563
Baseline: -0.00135563
Cal 0: 0.00135526
Cal 1: 10
Blank: -0.0059676
Baseline: -0.00135563
ICV: 10.1048
ICB: -0.00788868
LCS: 5.25047
12611 HA DAY10: 0.286144
12611 CT DAY10: 0.759838
12612 HA DAY10: 0.569004
12612 CT DAY10: 0.448412
12613 HA DAY10: 0.417885
12613 CT DAY10: 0.745184
12614 HA DAY10: 0.425879
12614 CT DAY10: 1.06771
12622 HA DAY10: 0.328016
12622 CT DAY10: 0.722242
CCV: 5.46642
CCB: -0.00684711
Baseline: -0.00135563
12638 HA DAY10: 0.92276
12638 CT DAY10: 0.943775
12639 HA DAY10: 0.802235
12639 CT DAY10: 0.353831
12640 HA DAY10: 0.419249
12640 CT DAY10: 0.301318
12641 HA DAY10: 1.72618
12641 CT DAY10: 1.6901
12546 10/19: 1.40052
12547 10/19: 6.21668
CCV: 5.37682
CCB: -0.00179628
Baseline: -0.00135563
12548 10/19: 4.12911
12549 10/19: 1.66759
12550 10/19: 2.18857
12551 10/19: 1.52039
12552 10/19: 0.191653
12589 10/19: 0.652191
12590 10/19: 0.835053
12591 10/19: 0.527453
12592 10/19: 1.58542
12593 10/19: 3.03686
CCV: 5.02637
CCB: -0.000630382
Baseline: -0.00135563

Peak Table: ammonia

File name: F:\FLOW_4\102799D.RST
Date: October ~~28~~, 1999
Operator: LKS 27

P	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1828142	10.004595
2	0	Carryover	CO	1	1	27244	0.147761
3	0	Carryover	CO	1	1	682	0.002375
3	0	Baseline	RB	1	1	0	-0.001356
3	0	Baseline	RB	1	1	0	-0.001356
6	1	Cal 0	C	1	1	495	0.001355
7	2	Cal 1	C	1	1	1827302	10.000000
8	0	Blank	U	1	1	-843	-0.005968
3	0	Baseline	RB	1	1	0	-0.001356
10	2	ICV	U	1	1	1846458	10.104847
11	1	ICB	U	1	1	-1194	-0.007889
12	3	LCS	U	1	1	959538	5.250472
13	31	12611 HA DAY10	U	1	1	52528	0.286144
14	32	12611 CT DAY10	U	1	1	139074	0.759838
15	33	12612 HA DAY10	U	1	1	104208	0.569004
16	34	12612 CT DAY10	U	1	1	82175	0.448412
17	35	12613 HA DAY10	U	1	1	76598	0.417885
18	36	12613 CT DAY10	U	1	1	136397	0.745184
19	37	12614 HA DAY10	U	1	1	78058	0.425879
20	38	12614 CT DAY10	U	1	1	195324	1.067707
21	39	12622 HA DAY10	U	1	1	60178	0.328016
22	40	12622 CT DAY10	U	1	1	132205	0.722242
23	3	CCV	U	1	1	998992	5.466417
2	1	CCB	U	1	1	-1003	-0.006847
3	0	Baseline	RB	1	1	0	-0.001356
26	41	12638 HA DAY10	U	1	1	168841	0.922760
27	42	12638 CT DAY10	U	1	1	172681	0.943775
28	43	12639 HA DAY10	U	1	1	146820	0.802235
29	44	12639 CT DAY10	U	1	1	64895	0.353831
30	45	12640 HA DAY10	U	1	1	76847	0.419249
31	46	12640 CT DAY10	U	1	1	55300	0.301318
32	47	12641 HA DAY10	U	1	1	315631	1.726184
33	48	12641 CT DAY10	U	1	1	309039	1.690103
34	49	12546 10/19	U	1	1	256130	1.400515
35	50	12547 10/19	U	1	1	1136070	6.216682
36	3	CCV	U	1	1	982623	5.376822
37	1	CCB	U	1	1	-81	-0.001796
3	0	Baseline	RB	1	1	0	-0.001356
39	51	12548 10/19	U	1	1	754658	4.129107
40	52	12549 10/19	U	1	1	304925	1.667588
41	53	12550 10/19	U	1	1	400111	2.188566
42	54	12551 10/19	U	1	1	278030	1.520385
43	55	12552 10/19	U	1	1	35264	0.191653
44	56	12589 10/19	U	1	1	119406	0.652191
45	57	12590 10/19	U	1	1	152816	0.835053
46	58	12591 10/19	U	1	1	96616	0.527453
47	59	12592 10/19	U	1	1	289912	1.585416
48	60	12593 10/19	U	1	1	555099	3.036863
49	3	CCV	U	1	1	918593	5.026368
	1	CCB	U	1	1	133	-0.000630
3	0	Baseline	RB	1	1	0	-0.001356



Absorbance (µAU) (E+06)
Channel 1 Ammonia
Time (sec)
Sync: 10.002
Carryover 0.136264
Carryover 0.00334979
Baseline: -0.000788562
Baseline: -0.000788562
Cal 0 0.000787377
Cal 1: 10
Blank -0.00104375
Baseline -0.000788562
ICV: 9.96412
ICB 0.00180689
LCS: 5.1772
12609 10/19: 0.106333
12610 10/19: 1.17547
12611 10/20 2.89305
12612 10/20 0.622594
12613 10/20 0.783781
12614 10/20: 0.992465
12622 10/20 0.10454
12589 HA 10/20 0.586392
12590 HA 10/20: 0.346856
12591 HA 10/20: 0.339743
CCV: 5.45582
CCB -0.000288971
Baseline: -0.000788562
12592 HA 10/20: 0.730012
12593 HA 10/20: 2.01
12609 HA 10/20 0.0147539
12610 HA 10/20: 1.40144
12615 HA 10/20 0.0826973
12664 HA 10/20 0.0164834
12664 CT 10/20 0.0824426
12665 HA 10/20 1.79189
12665 CT 10/20: 1.34054
12666 HA 10/20 2.26448
CCV: 5.4531
CCB 0.00152666
Baseline -0.000788562
12666 CT 10/20 0.868775
12668 HA 10/20 0.573109
12668 CT 10/20 0.605241
12671 HA 10/20 0.188643
12671 CT 10/20 0.304911
CCV: 5.53058
CCB 0.0346814
Baseline -0.000788562

Peak Table: ammonia

File name: E:\FLOW_4\102799E.RST
Date: October 28, 1999
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1827617	10.001991
2	0	Carryover	CO	1	1	25041	0.136264
3	0	Carryover	CO	1	1	756	0.003350
B	0	Baseline	RB	1	1	0	-0.000789
B	0	Baseline	RB	1	1	0	-0.000789
6	1	Cal 0	C	1	1	288	0.000787
7	2	Cal 1	C	1	1	1827253	10.000001
8	0	Blank	U	1	1	-47	-0.001044
B	0	Baseline	RB	1	1	0	-0.000789
10	2	ICV	U	1	1	1820698	9.964125
11	1	ICB	U	1	1	474	0.001807
12	3	LCS	U	1	1	946075	5.177200
13	61	12609 10/19	U	1	1	19572	0.106333
14	62	12610 10/19	U	1	1	214916	1.175473
15	63	12611 10/20	U	1	1	528736	2.893049
16	64	12612 10/20	U	1	1	113899	0.622594
17	65	12613 10/20	U	1	1	143349	0.783781
18	66	12614 10/20	U	1	1	181478	0.992465
19	67	12622 10/20	U	1	1	19245	0.104540
20	68	12589 HA 10/20	U	1	1	107284	0.586392
21	69	12590 HA 10/20	U	1	1	63518	0.346856
22	70	12591 HA 10/20	U	1	1	62219	0.339743
23	3	CCV	U	1	1	996983	5.455823
[illegible]	1	CCB	U	1	1	91	-0.000289
B	0	Baseline	RB	1	1	0	-0.000789
26	71	12692 HA 10/20	U	1	1	133525	0.730012
27	72	12593 HA 10/20	U	1	1	367392	2.009997
28	73	12609 HA 10/20	U	1	1	2840	0.014754
29	74	12610 HA 10/20	U	1	1	256203	1.401440
30	75	12615 HA 10/20	U	1	1	15254	0.082697
31	76	12664 HA 10/20	U	1	1	3156	0.016483
32	77	12664 CT 10/20	U	1	1	15207	0.082443
33	78	12665 HA 10/20	U	1	1	327542	1.791890
34	79	12665 CT 10/20	U	1	1	245075	1.340539
35	80	12666 HA 10/20	U	1	1	413889	2.264477
36	3	CCV	U	1	1	996484	5.453096
37	1	CCB	U	1	1	423	0.001527
B	0	Baseline	RB	1	1	0	-0.000789
39	81	12666 CT 10/20	U	1	1	158879	0.868775
40	82	12668 HA 10/20	U	1	1	104857	0.573109
41	83	12668 CT 10/20	U	1	1	110728	0.605241
42	84	12671 HA 10/20	U	1	1	34611	0.188643
43	85	12671 CT 10/20	U	1	1	55855	0.304911
44	3	CCV	U	1	1	1010641	5.530580
45	1	CCB	U	1	1	6481	0.034681
B	0	Baseline	RB	1	1	0	-0.000789

Peak	Cup	Flags
1	2	
2	0	
3	0	

3/8
10/12/99

#	ABS Sample ID		NVW <0.5	JWW <0.5
1.	105589	O	Y	Y
2.	590	O		
3.	591	O		
4.	592	O		
5.	593	O		
6.	10609	O		
7.	10610	O		
8.	10615	O		
9.	12611	O		
10.	612	O		
11.	613	O		
12.	614	O		
13	12622	O		
14	12635	O		
15	12639	O		
16	12640	O		
17	12641	O		
18	12546	PW		
19	547	PW		
20.	548	PW		

NVW 10/12/99

JWW 10/12/99

000069

#	ABS Sample ID		NVW <0.5 ppm	JWW <0.5
1	12664	PW	✓	✓
2	65	PW		
3	RHB 12671	PW		
4	10546	∅		
5	10547	∅		
6	10548	∅		
7	10549	∅		
8	550	∅		
9	10551	∅		
10	552	∅		
11	12664	∅		
12	665	∅		
13	666	∅		
14	668	∅		
15	671	∅	✓	

NVW 10/12/99

10/12/99

	NVW	JHW
	<0.5 ppms =	<0.5 ppms =
1. 12549 FW	✓	✓
2. 550 FW		
3. 12 551 FW		
4. 10 569 FW		
5. 590 FW		
6. 591 FW		
7. 592 FW		
8. 593 FW		
9. 10609 FW		
10. 12610 FW		
11. 611 FW		
12. 612 FW		
13. 613 FW		
14. 614 FW		
15. 12638 FW		
16. 639 FW		
17. 640 FW		
18. 641 FW		
19. 12666 FW	✓	
20.* 12666 FW	N	N

NVW 12/2/99

JHW 12/2/99

* 5.0 ppm MS

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3615

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/6/99 ✓ & 10/18/99; ALL SAMPLES (retest) JG ~~for LS~~ TM
- *C. tentans* acute test: 10/6/99 ✓
- *H. azteca* chronic test: 10/18/99; ALL SAMPLES JG for LS
- *C. tentans* chronic test: 12548, 12550, 12551; 10/18/99 JG for LS

10/28/99 – Loaded sediments for extra males (12548, 12550, 12551, 12552, 12592, 12593, 12609) JW

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12546	6.9			Viscous mud, NO overlying water
12547	7.0			Liquid, fine mud, many freshwater gastropods
				removed visible gastropods 10/6 TM
12548	7.0			Liquid mud, gastropods present, removed those visible 10/6 TM
12549	7.0			Soft mud, pine needles, some overlying water
12550	7.0			Soft mud with overlying water pine needles
12551	7.0			Soft mud with overlying water
12552 LCS	TM 10/6/99			EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% $CaCO_3$). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: TM Date: 10/6/99

Reviewer: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3622 / 3629

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* **acute test: 10/7/99** & 10/18/99 JG TM (Hyalella retest)
- *C. tentans* **acute test: 10/7/99**
- *H. azteca* **chronic test:**
- *C. tentans* **chronic test:** 10/18/99; 12592, 12593, 12609 TM

*Sample 12592 sieved to remove indigenous Chironimids. (for C.t. only).

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12589	7.1			dk brown muddy sediment with sticks and vegetative materi
12590	6.9			dk brown cohesive mud with veg. material
12591	6.9			brown mud with veg. material
* 12592	7.1			dk. brown mud with little veg. materia
12593	7.0			black watery mud w/petroleum-like odor
12609	7.1			thick dk. brown cohesive mud with veg. material
12610	7.2			dk brown, very thick cohesive mud w/some veg. material.
12615 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JJC Date: 10/7/99

Reviewer [signature] Date 12/10/99

Laboratory Aquatec Biological Sciences, South Burlington, Vermont

hasurwt.doc

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3629 / 3633

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/8/99
- *C. tentans* acute test: 10/8/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12611	6.8			black mud w/ leaf litter
12612	7.7			Fine Brown mud
12613	7.7			Soft Brown mud
12614	7.5			Soft Brown mud
12638	7.6			Soft Brown mud
12639	7.3			sticks + leaves on top + through out cohesive mud, dark
12640	7.2			sticks + leaf litter Dark thick mud
12641	7.2			Soft Brown mud
12622 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JJG Date: 10/8/99

Reviewer: JM Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

hasurvwt.doc

000074

Sediment Characterization

Client: Menzie-Cura & Assoc. Project: 99033	BTR: 3641

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/9/99
- *C. tentans* acute test: 10/9/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12664	7.8			fine cohesive mud.
12665	7.3			fine soft mud
12666	7.5			fine. Sticky / cohesive mud
~~12667-SG~~ 12671	7.4			fine, brown mud - chironomids present
12668 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: Date: 10/9/99

Reviewer Date 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

hasurvwt.doc

000075

Preparation of Formulated Control Sediment
for
Freshwater Sediment Toxicity Tests

Procedure based on EPA/600/R-94/024

Batch No. 10/4 Preparation Date: 10/4/99 Prepared by: JJG.

Ingredient	Amount (g)	Percent composition
Fine sand	1848	
Medium sand	924	77
Kaolinite clay	612	17
Blended and 0.~~3~~ 50 mm sieved Canadian sphagnum peat	180	5
CaCO3	36	1
Total	3600	100

Store well-mixed and dry in a sealed Rubbermaid box. Label by batch number. Store copy of this documentation in project file. Store original in Sed/Water preparation notebook.

Hydrate to a cohesive sediment consistency before use.

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of October 3, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?		✓	✓	✓	✓	✓	✓

Test monitoring

• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	✓
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓

Additional activities

Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

Corrective Action / Comments							
Initials/Date	JG 10/3	JG 10/4	JG 10/5	[illegible]	JG 10/7	[illegible] 10/8	JG 10/9

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer: J Date 12/13/99
Laboratory: Aquatec Biological Sciences South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 10, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓	✓	✓	✓	✓	✓	✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	(*3) ✓	✓	✓
• check for floating organisms	(*1) ✓	(*2) ✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	TM JG 10/10	JG AM 10/11	JG 10/12 TM	TM 10/13	TM 10/14	JG 10/15	JG 10/16

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:
(*1) 12591 nearly all reps had floaters 10/10 TM squirted them down most seemed to be living
(*2) 12591 E,F,H had floaters 10/11/99 TM
(*3) 12666 Ha and C+ got an extra manual renewal 10/14 JM am pm

Reviewer JT Date 12/13/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of October 17, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets? TWICE DAILY	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓ (1)	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JG JM 10/17	JG JM 10/18	JG JM 10/19	JG 10/20 JM	JG 10/21	JM 10/22	JG 10/23

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments: (1) C. tentans chronic test set ups were fed on Day -1 (day prior to organism additions) JG 10/18/99

Exposure water for H.a. chronic = Lake/Recon mix.
Exposure water for C.t. chronics = Recon Water. JG 10/22/99

Reviewer: JG Date 12/13/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of October 24, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

Test monitoring

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓

Additional activities

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Corrective Action / Comments							
Initials/Date	JG 10/24	TM 10/25	TM 10/26	TM JG 10/27	TM 10/28	10/29 JG	10/30 JG

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer J Date 12/13/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of October 31, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	—	—	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JG 10/31	11/1 JG	11/2 TM	11/3 TM	11/4 TM	JG 11/5	JG 11/6

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

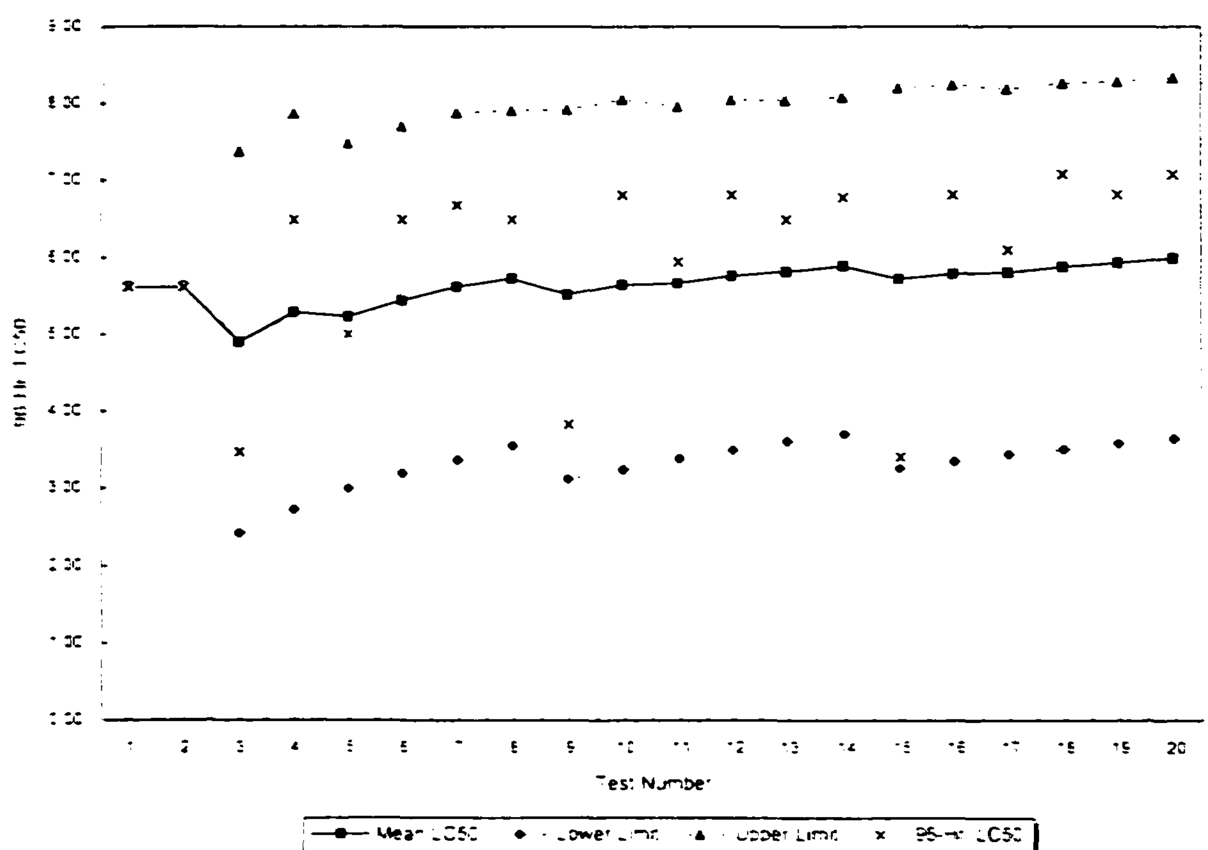
Comments: 11/5/99 (midnight) renewal missed. Renewal initiated at 09:30
"Noon" renewal conducted at 14:00 11/6 JG   11/6/99 JJG

Reviewer [illegible] Date 12/13/99

APPENDIX: D

Reference Toxicant Control Chart
Chironomus tentans
in Potassium chloride (g/L)

Test Number	Test Date	Organism Age (Days)	96-Hr. LC50	Mean LC50	Lower Limit	Upper Limit	Organism Source
1	10/28/97	10	5.612	5.61			Aquatec Biological Sciences
2	10/31/97	9	5.612	5.61	5.61	5.61	Aquatec Biological Sciences
3	11/02/97	9	3.466	4.90	2.42	7.37	Aquatec Biological Sciences
4	11/09/97	10	6.484	5.29	2.72	7.87	Aquatec Biological Sciences
5	11/10/97	9	5.000	5.23	2.99	7.48	Aquatec Biological Sciences
6	08/23/98	11	6.484	5.44	3.19	7.69	Aquatec Biological Sciences
7	09/15/98	9	6.674	5.62	3.38	7.87	Aquatec Biological Sciences
8	10/23/98	10	6.484	5.73	3.55	7.90	Aquatec Biological Sciences
9	11/10/98	9	3.827	5.52	3.12	7.91	Aquatec Biological Sciences
10	06/23/99	9	6.804	5.64	3.24	8.05	Aquatec Biological Sciences
11	06/24/99	11 and 10	5.946	5.67	3.39	7.96	Aquatec Biological Sciences
12	06/25/99	9 and 11	6.804	5.77	3.49	8.04	Aquatec Biological Sciences
13	07/15/99	13	6.484	5.82	3.61	8.04	Env. Consulting & Testing
14	07/16/99	10	6.771	5.89	3.70	8.08	Aquatec Biological Sciences
15	07/16/99	9	3.400	5.72	3.26	8.19	Aquatec Biological Sciences
16	07/16/99	8	6.804	5.79	3.35	8.24	Env. Consulting & Testing
17	09/13/99	10	6.095	5.81	3.44	8.18	Aquatec Biological Sciences
18	10/07/99	11	7.071	5.88	3.50	8.26	Aquatec Biological Sciences
19	10/11/99	10	6.804	5.93	3.58	8.28	Aquatec Biological Sciences
20	10/27/99	8	7.071	5.98	3.64	8.33	Aquatec Biological Sciences



Chironomus tentans Chronic Survival, Growth, Emergence and Reproduction Toxicity Tests Conducted on Sediment Samples from the Solutia Site, Sauget , Illinois

Reference BTRs 3615, 3622, 3629, 3633, 3641, 3643

Prepared for:
Menzie-Cura & Associates
1 Courthouse Lane, Suite 2
Chelmsford, MA 01824

Prepared by:
Aquatec Biological Sciences
75 Green Mountain Drive
South Burlington, Vermont

December 1999

B

Aquatec Biological Sciences

Ecology | Environmental Toxicology | Natural Resource Assessments | Microbiology

BTRs 3615, 3622, 3629, 3633, 3641, 3643

PROJECT: 99033

I have reviewed this data package, which was completed under my supervision. This data package is complete, and to the best of my ability, accurately reflects the conditions and the results of the reported tests.

John W. Williams
Toxicity Laboratory Manager

12/22/99
Date

I have reviewed and discussed this data package with the responsible laboratory manager. Based on this review, the data package was, to the best of my knowledge and belief, conducted in accordance with established company quality assurance procedures.

Philip C Downey

Philip C. Downey, Ph.D.
Director

12/23/99
Date

75 Green Mountain Drive South Burlington, VT 05403 Tel: 802.860.1638 Fax: 802.658.3189

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EXECUTIVE SUMMARY

100.5CT Midge. *Chironomus tentans* Chronic Survival, Growth, Emergence, and Reproduction
Conducted October 19 - December 14, 1999
for Menzie-Cura & Associates
Solutia Site, Sauget, Illinois

Laboratory Sample ID	Client Sample ID	Day 20 Mean Survival (%)	Day 20 Mean Ash Weight (mg)	Emergence Proportion (%)	Mean Eggs Hatched/ Female	Mean Days Survived, Female	Mean Days Survived, Male
12546	BTOX-C-1	Acute Toxicity		--	--	--	--
12547	BTOX-C-2	Acute Toxicity		--	--	--	--
12548	BTOX-C-3	63	3.186	56	526	2.4	3.7
12549	BTOX-D-1	Acute Toxicity		--	--	--	--
12550	BTOX-D-2	31	0.937*	2*	0*	0.8*	0*
12551	BTOX-D-3	42*	--	10*	298	0.6*	1.1*
12552	Laboratory Control	81	2.679	50	130	2.8	4.5
12589	BTOX-B-1	Acute Toxicity		--	--	--	--
12590	BTOX-B-1 (DUPE)	Acute Toxicity		--	--	--	--
12591	BTOX-B-2	Acute Toxicity		--	--	--	--
12592	BTOX-B-3	52	2.244	52	302	2.5	3.1
12593	BTOX-M	40	2.216	54	430	3.6	4.1
12609	E-1 Dead Creek	54	2.501	42	576	3.5	2.4
12610	E-2 Dead Creek	Acute Toxicity		--	--	--	--
12611	E-3 Dead Creek	0*	--	1*	0*	0.6*	0*
12612	BP-1 Borrow Pit	0*	--	5*	0*	0*	0.7*
12613	BP-1 Borrow Pit (DUPE)	0*	--	8*	127*	0.3*	0.8*
12614	BP-3 Borrow Pit	6*	--	14*	106*	0.8*	1.2*
12622	Laboratory Control	46	2.959	45	554	3.1	4.9
12638	BP-2 Borrow Pit	Acute Toxicity		--	--	--	--
12639	F-1 Dead Creek Section F	Acute Toxicity		--	--	--	--
12640	F-2 Dead Creek Section F	Acute Toxicity		--	--	--	--
12641	F-3 Dead Creek Section F	Acute Toxicity		--	--	--	--
12664	Prairie DuPont Creek	Acute Toxicity		--	--	--	--
12665	Prairie DuPont Creek 2	69	3.074	13*	249	1.1*	1.4*
12666	Reference Creek	Acute Toxicity		--	--	--	--
12668	Laboratory Control	65	2.923	69	354	3.6	4.3
12671	Ref 2-2 Ref. Borrow Pit	Acute Toxicity		--	--	--	--

The response data were statistically significantly different from the corresponding laboratory control sediment ($p \leq 0.05$)

-- When a statistically significant reduction in survival was detected, mean ash-free dry weight data were only reported in Appendix A

INTRODUCTION:

Samples were received for toxicity testing at Aquatec Biological Sciences of 75 Green Mountain Drive, South Burlington, Vermont. The results of the following tests are reported:

Client:	Menzie-Cura & Associates
Facility/Location:	Dead Creek / Sauget, Illinois
Initial Sampling Date:	October 4 - October 9, 1999
Testing Dates:	October 19 - December 14, 1999
Tests Conducted:	Midge, *Chironomus tentans*, Chronic Survival, Growth, Emergence, and Reproduction

METHODS:

Toxicity Tests

The procedures followed in conducting these toxicity tests were based on draft methods described by the USEPA (EPA 600/R-98/XXX [new number pending]). Test conditions for *Chironomus tentans* are listed in Table 1. Testing was completed in three separate groupings based upon chronological sequencing from the time of sediment collection. The objective for the test groupings was to complete the 10-day acute tests prior to expiration of a project-specific 14-day sediment storage time so that subsequent chronic toxicity tests could be started within a 14-day time frame. The acute toxicity results were reported separately (Aquatec Biological Sciences, December 1999).

Sediments were loaded into beakers for chronic testing within one day after completion of the acute toxicity tests, therefore, the objective of starting all tests within 14-days from the time of collection was accomplished for all samples. Chronic toxicity testing for the first testing group was initiated on October 19, 1999. The second testing group was initiated on October 20, 1999. The third testing group was initiated on October 21, 1999. A laboratory control (artificial sediment) was included with each testing group. Midge larvae less than four hours old were obtained from Aquatec Biological Sciences in-house cultures. Chronic toxicity tests were ended (on an individual sample basis) following seven days with no observed emergence. Overlying water was renewed either automatically or manually. For those samples/replicates renewed automatically, the renewal cycle was programmed for midnight and noon of each day. For samples/replicates renewed manually. the renewal cycle was performed at approximately 7:00 a.m. and 7:00 p.m. daily. Documentation of renewals and renewal system checks is located in Appendix C

Sediment Preparation

The samples were stored refrigerated and in the dark whenever they were not being used in preparation for testing. Sediments distributed in test beakers were examined for the presence of indigenous organisms which were removed when observed. Also, large pieces of vegetative material (e.g., leaf litter, sticks, grass) were removed if observed. Qualitative observations regarding the sediment type and indigenous organisms removed were recorded. The laboratory control sediment (artificial sediment) was prepared following formulations specified in the USEPA protocols and then hydrated prior to distribution to test chambers. Sediments were then distributed to individual replicate test chambers, overlying water was added, and the overlying water renewal system was activated. The unused portion of each sample (in the original sample container) was returned to refrigerated storage.

During acute toxicity testing indigenous chironomid larvae found in Sample 12592 (BTOX-B-3) confounded the acute toxicity assessment. Prior to loading this sediment into beakers for the chronic toxicity test the sediment was sieved through a 0.3 micron Nitex mesh screen to remove indigenous chironomids.

Statistical Analyses

Statistical endpoints included survival and growth (as measured by mean ash-free dry weight) of midge larvae, evaluated on Day 20. At the end of the test, proportion emergence, reproduction (mean number of eggs per female), and mean number of days male and female flies survived (after emergence) were evaluated.

Statistical comparisons were performed against the concurrent laboratory control. In some cases, where the mean laboratory control response was numerically less than or equal to the test sediment the test samples were judged to be non-significant. If complete mortality was observed in any sample, the response was considered to be significant. Statistical significance for any sample was based upon the most sensitive endpoint observed.

An F-Test was performed to test for equality of variances between each sample and the corresponding control for each endpoint examined. Proportion surviving data were transformed (Arcsin square-root) before analysis. If variances were not significantly different, paired T-Tests with equal variances were used to determine whether there was a significant reduction in the mean response relative to the corresponding control. If the variance between a sample and control comparison was significantly different, paired T-Tests adjusted for unequal variances were used to identify significant reductions in the response.

PROTOCOL DEVIATIONS:

At the Day 20 assessments of survival and growth, some pupating larvae and post-emergent body casts were found in some test replicates. Day 20 survival totals were established by combining larvae, pupae, and the number of body casts present. Day 20 growth assessments (ash-free dry weight) were based upon surviving larvae only.

Replicate J of Sample 12551 (one larva surviving) had an apparent weighing and was excluded from the data analysis.

On occasion, the number of days that emerged flies survived was not recorded due either to escapes from emergence traps or oviposition chambers, accidental injury, or a laboratory error in recording the number of days until mortality for individual flies. A list of the affected test replicates is located at the end of Appendix C. For those flies where time-to-mortality was not recorded, they were included in the emergence tabulations but were excluded from the days survived tabulations.

RESULTS:

Summary result tabulations for the *Chironomus tentans* whole sediment toxicity tests are located in Appendix A.

Group 1 Test Results: This group included Samples 12548 (BTOX-C-3). 12550 (BTOX-D-2),

12551 (BTOX-D-3), 12592 (BTOX-B-3), 12593 (BTOX-M), and 12609 (E-1 Dead Creek). Sample 12550 (BTOX-D-2) had a significant reduction in Day 20 growth and also significant reductions in proportion emerged and mean number of days male and female flies survived. Sample 12551 (BTOX-D-3) had significant reductions in Day 20 survival and also significant reductions in proportion emerged and mean number of days male and female flies survived.

Group 2 Test Results: This group included samples 12611 (E-3 Dead Creek), 12612, (BP-1 Borrow Pit), 12613 (BP-1 Borrow Pit duplicate), and 12614 (BP-3 Borrow Pit). Samples 12611 (E-3 Dead Creek), 12612, (BP-1 Borrow Pit), 12613 (BP-1 Borrow Pit duplicate), and 12614 (BP-3 Borrow Pit) had significant reductions for all response parameters evaluated.

Group 3 Test Results: This group included sample 12665 (Prairie Du Pont Creek 2). Sample 12665 had significant reductions in proportion emerged and mean number of days males and females survived.

Total Ammonia and Sulfide: Total ammonia concentrations were less than 25mg/L in porewater and less than 5 mg/L in overlying water. Total sulfide was not detected (<0.5mg/L) in any porewater samples during the initial acute toxicity testing, therefore, testing for sulfide in overlying water was not conducted.

QUALITY ASSURANCE:

A standard reference toxicant SRT tests were conducted with representative batches of *Chironomus tentans*. The resulting LC50 values fell within control chart limits and were viewed as being acceptable.

Table 1. **Test Conditions for the Midge (*Chironomus tentans*) Chronic Whole Sediment Survival, Growth, Emergence and Reproduction Toxicity Test.**

ASSOCIATED PROTOCOL: EPA, 1997. Draft *Methods for Measuring the Toxicity and Bioaccummulation of Sediment-associated Contaminants with Freshwater Invertebrates,* Second Edition Method 100.5 (EPA/600/R-98/XXX).

1. Test type:	Whole-sediment toxicity (static renewal)
2. Test temperature:	23 ± 1°C
3. Light quality:	Wide-spectrum fluorescent lights
4. Light illuninance:	500 to 1000 lux
5. Photoperiod:	16 hr. light, 8 hr. dark
6. Test chamber size:	300 mL beaker
7. Sediment volume:	100 mL (distributed to test chambers on the day prior to administration of test organisms
8. Overlying water volume:	175 mL
9. Renewal of overlying water	Twice daily
10. Age of test organisms:	Larvae less than 24-h old
11. Number of organisms / test chamber:	12 (acclimated to test conditions)
12. Number of replicate test chambers / treatment:	16 (4 for 20-day survival and growth and 8 for emergence, reproduction, and fly survival). An additional 4 replicates on Day 20 started as a source of auxiliary males.
13. Feeding regime:	1.0 mL Tetrafin slurry (1.0 mg/mL daily)
14. Aeration:	None, unless dissoved oxygen in overlying water drops below 2.5 mg/L. Supplemental water renewals may be implemented to raise dissolved oxygen concentrations.

Table 1. Test Conditions for the Midge (*Chironomus tentans*) Chronic Whole Sediment Survival, Growth. Emergence and Reproduction Toxicity Test (continued).

15. Overlying water:	Reconstituted water
16. Control sediment:	Formulated sediment (EPA/600/R-94/024. section 7.2.3.2)
17. Test chamber cleaning:	Overflow screens. as needed
18. Monitoring:	
Overlying water	
Temperature	Daily. one replicate
Dissolved oxygen	At least three days weekly
pH	At least three days weekly
Conductivity	At least Days 0. 20. and end of test
Alkalinity. hardness. ammonia	At least Days 0. 20. and end of test
Organism behavior	Daily. all replicates
19. Test duration:	On an individual sample basis. when no additional emergence has been recorded for seven consecutive days.
20. End points:	Day 20 survival and growth (ash-free dry weight. larvae dried 60°C-90°C overnight. then ashed at 550°C for 2 h). Reproduction (average hated eggs produced per female) and number of days emergent flies survived (male and female).
21 Reference toxicant:	96-h acute. water only (KCl)
22. Test acceptability:	Reference or Laboratory Control survival should be 70% or greater on Day 20 with adherence to performance-based criteria outlined in EPA/600/R-98/XXX. Table 15.3
23. Statistical analysis and data interpretation:	Paired-sample hypothesis testing (e.g. t-test) versus the negative control and/or the appropriate reference site. Proportion data transformed (Arc-sine (square-root)) before analysis.

APPENDIX A

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Chronic Toxicity Test
BTR: 3615/3622

Day 20		Survival: Proportion Surviving	Survival: F-Test Equal Variance[2]	Survival: T-Test Statistical Probability	Survival: Statistically Significant[1]	Growth: Average Weight (mg)	Growth: F-Test Equal Variance	Growth: T-Test Statistical Probability	Growth: Statistically Significant[1]
12552	Control	0.81				2.679			
12548	Sample	0.63	0.218	0.092		3.186	0.579	0.225	
12550	Sample	0.31	0.033	0.053		0.937	0.396	0.026	*
12551	Sample	0.42	0.072	0.031	*	1.950	0.161	0.243	
12592	Sample	0.52	0.095	0.053		2.244	0.546	0.179	
12593	Sample	0.40	0.160	0.000	*	2.216	0.946	0.195	
12609	Sample	0.54	0.079	0.088		2.501	0.869	0.376	

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).
2. If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

Chironomus tentans
Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3615/3622
Aquatec Biological Sciences

Sample Number	Replicate	Start Count	Day 20 Data # Surviving	Proportion Surviving	Mean Proportion Surviving	Ashed Pan Wt. + Larval Dry Weight (mg)	Ashed Pan and Ashed Larval Wt. (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12552	I	12	10	0.83		2503.78	2487.15	5	3.326	
	J	12	11	0.92		2289.24	2269.48	11	1.796	
	K	12	9	0.75		2407.95	2388.70	6	3.208	
	L	12	9	0.75		2453.63	2432.17	9	2.384	
					0.81					2.679
12548	I	12	11	0.92		2267.44	2243.55	11	2.172	
	J	12	7	0.58		2142.36	2123.31	7	2.721	
	K	12	7	0.58		2408.08	2388.36	6	3.287	
	L	12	5	0.42		2306.17	2287.91	4	4.565	
					0.63					3.186
12550	I	12	0	0.00		0.00	0.00	0	0.000	
	J	12	11	0.92		2167.44	2136.97	11	2.770	
	K	12	3	0.25		2182.25	2180.82	3	0.477	
	L	12	1	0.08		2491.36	2490.86	1	0.500	
					0.31					0.937
12551	I	12	8	0.67		2323.33	2292.54	8	3.849	
	J	12	1	0.08				*	*	
	K	12	9	0.75		2315.55	2290.15	9	2.822	
	L	12	2	0.17		2392.79	2389.75	2	1.520	
					0.42					2.048
12592	I	12	1	0.08		2446.30	2444.62	1	1.680	
	J	12	8	0.67		2192.47	2176.60	7	2.267	
	K	12	9	0.75		2403.31	2380.29	8	2.878	
	L	12	7	0.58		2397.21	2382.15	7	2.151	
					0.52					2.244
12593	I	12	5	0.42		2318.30	2302.13	5	3.234	
	J	12	5	0.42		2427.55	2422.12	3	1.810	
	K	12	5	0.42		2317.83	2307.51	5	2.064	
	L	12	4	0.33		2305.34	2301.83	2	1.755	
					0.40					2.216
12609	I	12	11	0.92		2146.97	2131.58	11	1.399	
	J	12	8	0.67		2205.14	2184.15	8	2.624	
	k	12	5	0.42		2509.45	2492.85	5	3.320	
	L	12	2	0.17		2288.60	2283.28	2	2.660	
					0.54					2.501

* A weighing error occurred. See Protocol Deviations.

T 12/22/99

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Chronic Toxicity Test
BTR: 3615/3622

		Emergence				Reproduction			
		Proportion Emerged	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,3]	Mean Eggs Hatched/ Female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,3]
12552	Control	0.50				130.2			
12548	Sample	0.56	0.080	0.398		526.5	0.034	0.052	
12550	Sample	0.02	0.324	0.000	*	0.0	NA[2]	0.079	*
12551	Sample	0.10	0.312	0.000	*	297.6	0.024	0.251	
12592	Sample	0.52	0.121	0.260		301.8	0.223	0.160	
12593	Sample	0.54	0.032	0.312		430.2	0.271	0.041	
12609	Sample	0.42	0.120	0.066		576.3	0.094	0.018	

		Days Survived, Female				Days Survived, Male			
		Mean Days Survived / Female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Mean Days Survived / Male	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]
12552	Control	2.8				4.5			
12548	Sample	2.4	0.805	0.296		3.7	0.836	0.198	
12550	Sample	0.8	0.221	0.028	*	0.0	NA[2]	0.000	*
12551	Sample	0.6	0.661	0.003	*	1.1	0.850	0.003	*
12592	Sample	2.5	0.860	0.369		3.1	0.618	0.074	
12593	Sample	3.6	0.634	0.174		4.1	0.793	0.344	
12609	Sample	3.5	0.209	0.250		2.4	0.824	0.034	*

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).
2. There were not enough sample and/or control response variability to conduct a meaningful F-Test.
3. If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

Chironomus tentans
Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3615/3622
Aquatec Biological Sciences

				Chronic Endpoints										
			End of Test	Emerged				Eggs			Number of Days Survived			
Sample Number	Replicate	Start Count	Larvae Survived	Females #	Males #	Total #	Proport.	Total #	Unhatched #	Eggs /female	Female days	Ave.	Males days	Ave.
12552	A	12	0	3	5	8	0.67	0	0	0	8	4.0	24	4.8
	B	12	0	3	3	6	0.50	516	516	0	12	4.0	18	6.0
	C	12	0	0	4	4	0.33	0	0	0	0	0.0	21	5.3
	D	12	0	3	2	5	0.42	1285	12	424	5	2.5	13	6.5
	E	12	0	2	8	10	0.83	0	0	0	4	2.0	38	4.8
	F	12	0	3	3	6	0.50	1862	11	617	13	4.3	8	4.0
	G	12	0	2	5	7	0.58	902	902	0	5	2.5	23	4.6
	H	12	0	2	0	2	0.17	1506	1508	0	6	3.0	0	0.0
Average per sample							0.50			130		2.8		4.5
12548	A	12	0	4	3	7	0.58	3064	170	724	14	3.5	15	5.0
	B	12	0	1	5	6	0.50	0	0	0	4	4.0	20	4.0
	C	12	0	4	6	10	0.83	3452	1462	498	10	3.3	16	2.7
	D	12	0	2	8	10	0.83	1674	810	432	6	3.0	18	2.6
	E	12	1	4	3	7	0.58	3591	376	804	9	2.3	15	5.0
	F	12	0	2	10	12	1.00	3559	49	1755	6	3.0	45	4.5
	G	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	H	12	2	0	2	2	0.17	0	0	0	0	0.0	11	5.5
Average per sample							0.56			526		2.4		3.7
12550	A	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	B	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	C	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	D	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	E	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	F	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	G	12	0	2	0	2	0.17	0	0	0	13	6.5	0	0.0
	H	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
Average per sample							0.02			0		0.8		0.0
12551	A	12	1	2	1	3	0.25	1254	12	621	6	3.0	5	5.0
	B	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	C	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	D	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	E	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	F	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	G	12	0	1	6	7	0.58	2077	317	1760	2	2.0	25	4.2
	H	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
Average per sample							0.10			298		0.6		1.1
12592	A	12	1	4	2	6	0.50	4022	373	912	19	4.8	9	4.5
	B	12	0	3	2	5	0.42	0	0	0	3	1.0	6	3.0
	C	12	0	3	5	8	0.67	700	30	223	8	2.7	13	2.6
	D	12	0	1	3	4	0.33	0	0	0	3	3.0	6	2.0
	E	12	0	3	5	8	0.67	3090	224	955	11	3.7	21	4.2
	F	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	G	12	0	4	6	10	0.83	1076	200	220	13	3.3	31	5.2
	H	12	0	4	5	9	0.75	530	115	104	8	2.0	10	3.3
Average per sample							0.52			302		2.5		3.1
12593	A	12	0	2	5	7	0.58	1822	140	841	9	4.5	17	3.4
	B	12	0	3	3	6	0.50	900	900	0	9	3.0	6	2.0
	C	12	0	5	1	6	0.50	3974	339	727	17	3.4	7	7.0
	D	12	0	4	1	5	0.42	3678	435	861	12	4.0	0	0.0
	E	12	0	1	5	6	0.50	0	0	0	0	0.0	14	4.7
	F	12	0	2	6	8	0.67	941	75	433	8	4.0	27	5.4
	G	12	0	4	4	8	0.67	3118	800	580	14	3.5	20	5.0
	H	12	0	1	5	6	0.50	0	0	0	6	6.0	25	5.0
Average per sample							0.54			430		3.6		4.1
12609	A	12	0	3	3	6	0.50	1628	1181	216	11	3.7	9	3.0
	B	12	0	3	1	4	0.33	4004	2258	582	11	3.7	0	0.0
	C	12	0	3	4	7	0.58	2089	560	510	18	6.0	17	4.3
	D	12	0	1	4	5	0.42	1102	13	1089	6	6.0	8	2.7
	E	12	0	3	6	9	0.75	3958	271	1229	13	4.3	25	5.0
	F	12	0	4	5	9	0.75	4179	240	985	15	4.0	23	4.6
	G	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	H	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
Average per sample							0.42			576		3.5		2.4

RH3
12/22

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Chronic Toxicity Test
BTR: 3629

Day 20		Survival				Growth			
		Proportion Surviving	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Average Weight (mg)	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]
12622	Control	0.46				2.959			
12611	Sample	0.00	NA[2]	0.000	*	0.000	NA[2]	0.000	*
12612	Sample	0.00	NA[2]	0.000	*	0.000	NA[2]	0.000	*
12613	Sample	0.00	NA[2]	0.000	*	0.000	NA[2]	0.000	*
12614	Sample	0.06	NA[2]	0.003	*	0.959	NA[2]	0.000	*

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$).
2. There were not enough sample and/or control response variability to conduct a meaningful F-Test.

Chironomus tentans Chronic Toxicity Test Results | Menzie-Cura Dead Creek 99033 | BTR 3629 Aquatec Biological Sciences

Sample Number	Replicate	Start Count	# Surviving	Proportion Surviving	Mean Proportion Surviving	Ashed Pan Wt. + Larval Dry Weight (mg)	Ashed Pan and Ashed Larval Wt. (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
			Day 20 Data							
12622	I	12	7	0.58		2139.80	2123.57	6	2.705	
	J	12	4	0.33		2396.04	2387.54	3	2.833	
	K	12	7	0.58		2303.40	2289.39	5	2.802	
	L	12	4	0.33		2322.18	2315.19	2	3.495	
					0.46					2.959
12611	I	12	0	0.00		0.00	0.00	0	0.000	
	J	12	0	0.00		0.00	0.00	0	0.000	
	K	12	0	0.00		0.00	0.00	0	0.000	
	L	12	0	0.00		0.00	0.00	0	0.000	
					0.00					0.000
12612	I	12	0	0.00		0.00	0.00	0	0.000	
	J	12	0	0.00		0.00	0.00	0	0.000	
	K	12	0	0.00		0.00	0.00	0	0.000	
	L	12	0	0.00		0.00	0.00	0	0.000	
					0.00					0.000
12613	I	12	0	0.00		0.00	0.00	0	0.000	
	J	12	0	0.00		0.00	0.00	0	0.000	
	K	12	0	0.00		0.00	0.00	0	0.000	
	L	12	0	0.00		0.00	0.00	0	0.000	
					0.00					0.000
12614	I	12	0	0.00		0.00	0.00	0	0.000	
	J	12	0	0.00		0.00	0.00	0	0.000	
	K	12	3	0.25		2251.81	2240.30	3	3.837	
	L	12	0	0.00		0.00	0.00	0	0.000	
					0.06					0.959

Summary of Statistical Tests and Probabilities
Industriplex *Chironomus tentans* Chronic Toxicity Test
BTR: 3629

		Emergence				Reproduction			
		Proportion Emerged	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,3]	Mean Eggs Hatched/ Female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,3]
12622	Control	0.45				554.2			
12611	Sample	0.01	0.004	0.000	*	0.0	NA[2]	0.003	*
12612	Sample	0.05	0.365	0.000	*	0.0	NA[2]	0.003	*
12613	Sample	0.08	0.694	0.002	*	127.0	0.434	0.033	*
12614	Sample	0.14	0.791	0.008	*	106.0	0.063	0.017	*

		Days Survived, Female				Days Survived, Male			
		Mean Days Survived	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,3]	Mean Days Survived	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,3]
12622	Control	3.1				4.9			
12611	Sample	0.6	0.568	0.004	*	0.0	NA[2]	0.000	*
12612	Sample	0.0	NA[2]	0.000	*	0.7	0.413	0.000	*
12613	Sample	0.3	0.308	0.000	*	0.8	0.997	0.000	*
12614	Sample	0.8	0.965	0.002	*	1.2	0.237	0.001	*

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, $P<0.05$).
2. There were not enough sample and/or control response variablility to conduct a meaningful F-Test.
3. If the F-Test result was significant (relative to the Laboratory Control, $P<0.05$), the T-Test was performed using unequal variances.

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Chironomus tentans
Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3629
Aquatec Biological Sciences

				Chronic Endpoints										
			End of Test	Emerged				Eggs			Number of Days Survived			
Sample Number	Replicate	Start Count	Larvae Survived	Females #	Males #	Total #	Proport.	Total #	Unhatched #	Eggs/ Female	Female days	Ave.	Males days	Ave.
12622	A	12	0	4	8	12	1.00	265	25	64	16	4.0	35	5.0
	B	12	0	3	1	4	0.33	0	0	0	10	3.3	5	5.0
	C	12	0	1	3	4	0.33	1361	6	1355	4	4.0	16	5.3
	D	12	0	1	1	2	0.17	883	100	783	3	3.0	2	2.0
	E	12	0	3	2	5	0.42	2062	143	640	5	2.5	9	4.5
	F	12	0	3	6	9	0.75	2576	75	834	8	4.0	26	4.3
	G	12	1	3	3	6	0.50	2447	174	758	13	4.3	18	6.0
	H	12	0	0	1	1	0.08	0	0	0	0	0.0	7	7.0
Average per sample							0.45			554		3.1		4.9
12611	A	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	B	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	C	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	D	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	E	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	F	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	G	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	H	12	0	1	0	1	0.08	0	0	0	5	5.0	0	0.0
Average per sample							0.01			0		0.6		0.0
12612	A	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	B	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	C	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	D	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	E	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	F	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	G	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	H	12	0	2	3	5	0.42	0	0	0	0	0.0	17	5.7
Average per sample							0.05			0		0.0		0.7
12613	A	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	B	12	0	0	1	1	0.08	0	0	0	0	0.0	3	3.0
	C	12	0	3	4	7	0.58	3591	543	1016	8	2.7	13	3.3
	D	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	E	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	F	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	G	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	H	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
Average per sample							0.08			127		0.3		0.8
12614	A	12	0	3	6	9	0.75	612	3	203	9	3.0	22	3.7
	B	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	C	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	D	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	E	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	F	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	G	12	0	3	1	4	0.33	2336	400	645	6	3.0	6	6.0
	H	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
Average per sample							0.14			106		0.8		1.2

RHB
12/22

Summary of Statistical Tests and Probabilities
Dead Creek *Chironomus tentans* Chronic Toxicity Test
BTR: 3641

Day 20		Survival: Proportion Surviving	Survival: F-Test Equal Variance	Survival: T-Test Statistical Probability	Survival: Statistically Significant[1]	Growth: Average Weight (mg)	Growth: F-Test Equal Variance	Growth: T-Test Statistical Probability	Growth: Statistically Significant[1]
12668	Control	0.65				2.923			
12665	Sample	0.69	0.689	0.404		3.074	0.899	0.400	

1 * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05)

Sample Number	Replicate	Start Count	Day 20 Data # Surviving	Proportion Surviving	Mean Proportion Surviving	Ashed Pan Wt. + Larval Dry Weight (mg)	Ashed Pan and Ashed Larval Wt. (mg)	# Organisms Weighed	Mean Wt. within Rep (mg)	Mean Wt. Reps I-L (mg)
12668	I	12	7	0.58		2271.36	2263.76	3	2.533	
	J	12	10	0.83		2398.12	2386.84	4	2.820	
	K	12	10	0.83		2448.78	2430.38	8	2.300	
	L	12	4	0.33		2453.15	2445.07	2	4.040	
					0.65					2.923
12665	I	12	11	0.92		2346.80	2326.20	11	1.873	
	J	12	3	0.25		2290.05	2282.89	2	3.580	
	K	12	9	0.75		2420.25	2395.18	8	3.134	
	L	12	10	0.83		2488.41	2484.70	1	3.710	
					0.69					3.074

Summary of Statistical Tests and Probabilities
Industriplex *Chironomus tentans* Chronic Toxicity Test
BTR: 3641

		Emergence				Reproduction			
		Proportion Emerged	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]	Mean Eggs Hatched/ Female	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1]
12668	Control	0 69				354 2			
12665	Sample	0 13	0 454	0 000	*	248 8	0 710	0.317	

		Days Survived, Female				Days Survived, Male			
		Mean Days Survived	F-Test Equal Variance	T-Test Statistical Probability	Statistically Significant[1,2]	Mean Days Survived	F-Test Equal Variance	T-Test Statistical Probability	Statistically ignificant[1,2]
12668	Control	3.6				4.3			
12665	Sample	1.1	0.049	0.003	*	1.4	0.007	0.007	*

1. * A statistically significant reduction in the response was observed (relative to the Laboratory Control, P<0.05).
2. If the F-Test result was significant (relative to the Laboratory Control, P<0.05), the T-Test was performed using unequal variances.

000011

Chironomus tentans
Chronic Toxicity Test Results

Menzie-Cura
Dead Creek
99033

BTR 3641
Aquatec Biological Sciences

				Chronic Endpoints										
			End of Test	Emerged				Eggs			Number of Days Survived			
Sample Number	Replicate	Start Count	Larvae Survived	Females #	Males #	Total #	Proport.	Total #	Unhatched #	Eggs /female	Female days	Ave.	Males days	Ave.
12668	A	12	0	6	2	8	0.67	3669	435	539	18	3.6	10	5.0
	B	12	0	4	3	7	0.58	2275	350	481	18	4.5	9	3.0
	C	12	0	2	5	7	0.58	1372	250	561	10	5.0	20	4.0
	D	12	0	2	8	10	0.83	0	0	0	3	3.0	33	4.7
	E	12	0	1	8	9	0.75	0	0	0	2	2.0	30	3.8
	F	12	0	4	7	11	0.92	703	207	124	14	3.5	32	5.3
	G	12	0	4	7	11	0.92	2637	2637	0	14	3.5	26	3.7
	H	12	0	1	2	3	0.25	1144	16	1128	4	4.0	5	5.0
Average per sample							0.69			354		3.6		4.3
12665	A	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	B	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	C	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	D	12	0	4	1	5	0.42	3834	191	911	15	3.8	6	6.0
	E	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	F	12	0	1	4	6	0.50	1104	24	1080	5	5.0	20	5.0
	G	12	0	0	0	0	0.00	0	0	0	0	0.0	0	0.0
	H	12	0	0	0	1	0.08	0	0	0	0	0.0	0	0.0
Average per sample							0.13			249		1.1		1.4

RHB
12/21

APPENDIX B

Aquatec Biological Sciences

Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE/ PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4°C
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453-4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453-7260			
Contact Name: Ken Cerrelo, Ph.D.	Quote #: 3/99 Client Code: MENCUR	Hand Delivered: ___ Yes ___ No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS					
BTOX-C-1	10/4			\	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.4				
BTOX-C-1-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.4				
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						
					Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity						

Relinquished by: *(signature)*	DATE	TIME	Received by: *(signature)*
Kenneth T. Merrit	10/4/99	17:00	Karen Dawley
Relinquished by: *(signature)*	DATE 10/5/99	TIME 10:00	Received by: *(signature)*
Relinquished by: *(signature)*	DATE	TIME	Received by: *(signature)*

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ____ °C

3 Coolers

Page ___ of ___

Aquatec Biological Sciences

Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION	COMPANY'S PROJECT INFORMATION	SHIPPING INFORMATION	VOLUME/CONTAINER TYPE / PRESERVATIVE
Name: Menzie Cura & Associates	Project Name: Dead Creek Sediment Tox	Carrier:	4ºC
Address: One Courthouse Lane, Suite 2, Chelmsford, MA 01824	Project Number: 99033	Airbill Number:	plastic
Telephone: (978) 453-4300	Sampler Name(s):	Date Shipped:	1 gal
Facsimile: (978) 453-7260			
Contact Name: Ken Cerrelo, Ph.D.	Quote #: 3/99 Client Code: MENCUR	Hand Delivered: ___ Yes ___ No	

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS	
BTOX-C-3-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9
BTOX-D-3	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9
BTOX-D-3-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9
BTOX-C-2-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9
BTOX-C-2	10/4			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	/	T=0.9

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth M Cerrelo	10/4/99	17:00	
Relinquished by: (signature)	DATE	TIME	Received by: (signature)
	10/5/99	10:00	Karen Dorsey
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ____ ºC

3 Coolers

Page ____ of ____

Aquatec Biological Sciences
Chain-of-Custody Record

75 Green Mountain Drive
South Burlington, VT 05403
TEL: (802) 860-1638
FAX: (802) 658-3189

COMPANY INFORMATION

Name: Menzie Cura & Associates
Address: One Courthouse Lane, Suite 2
Chelmsford, MA 01824
Telephone: (978) 453-4300
Facsimile: (978) 453-7260
Contact Name: Ken Cerrelo, Ph.D.

COMPANY'S PROJECT INFORMATION

Project Name: Dead Creek Sediment Tox
Project Number: 99033
Sampler Name(s): ____
Quote #: 3/99 Client Code: MENCUR

SHIPPING INFORMATION

Carrier: ____
Airbill Number: ____
Date Shipped: ____
Hand Delivered: ___ Yes ___ No

VOLUME/CONTAINER TYPE/ PRESERVATIVE

4ºC
plastic
1 gal

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMPOSITE	MATRIX	ANALYSIS / REMARKS	NUMBER OF CONTAINERS	
BTOX-D-3	10/1			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5
BTOX-D-2-2	10/1			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5
BTOX-D-1	10/1			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5
BTOX-D-1-2	10/1			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5
BTOX-C-3	10/1			✓	Sediment	*Hyalella azteca* 10-d Survival & Growth *Hyalella azteca* 42-day Chronic Toxicity *Chironomus tentans* 10-d Survival & Growth *Chironomus tentans* Chronic Toxicity	1	T=0.5

Relinquished by: (signature)	DATE	TIME	Received by: (signature)
Kenneth Klimet	10/4/99	17:00	
Relinquished by: (signature)	DATE	TIME	Received by: (signature)
	10/5/99	10:00	Karen Downey
Relinquished by: (signature)	DATE	TIME	Received by: (signature)

NOTES TO SAMPLER(S): We recommend nesting samples in ice to maintain 4°C during shipment. Please cover sample labels with clear tape (labels are not waterproof)

Notes to Lab: Cooler ambient temperature upon delivery: ____ ºC

3 Coolers

Serial Number 137910

SL ~~SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.~~
Aquatech Colchester, VT

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

[In two (2) coolers]

5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax: (912) 352-0165
2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax: (904) 878-9504
414 SW 12th Avenue, Deerfield Beach, FL 33442 — Phone: (954) 421-7400 — Fax: (954) 421-2584
900 Lakeside Drive, Mobile, AL 36693 — Phone: (334) 666-6633 — Fax: (334) 666-6696
6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax: (813) 885-7049
100 Alpha Drive, Suite 110, Destrehan, LA 70047 — Phone: (504) 764-1100 — Fax: (504) 725-1163

PROJECT REFERENCE: Sauget Area I
PROJECT NO.: 648B
P.O. NUMBER:
PROJECT LOC. (State): IL
SAMPLER(S) NAME: C. Menzie, K. Nozarty
PHONE: 978-453-4300
FAX: 978-453-7260
CLIENT NAME: Menzie-Cura Solutions
CLIENT PROJECT MANAGER: C. Menzie
CLIENT ADDRESS (CITY, STATE, ZIP): 1 Courthouse Lane Suite 2 Chelmsford MA

PAGE 1 OF 1

MATRIX TYPE: AQUEOUS (WATER) / SOLID OR SEMISOLID / AIR / NONAQUEOUS LIQUID (OIL, SOLVENT, ...)

REQUIRED ANALYSES: 1/2 TOX - Hazpro (contains units + ...) — NOT

[X] STANDARD REPORT DELIVERY
[ ] EXPEDITED REPORT DELIVERY (surcharge) — Date Due

SAMPLE DATE	SAMPLE TIME	SL NO.	SAMPLE IDENTIFICATION	Aqueous	Solid	Air	Nonaqueous	NUMBER OF CONTAINERS SUBMITTED	REMARKS
10/5/99	9:45		BTOX-B-1		X			2	
10/5/99	9:45		BTOX-B-1 (dupe)		X			2	
10/5/99	14:10		BTOX-B-2		X			2	
10/5/99	9:00		BTOX-B-3		X			2	
10/5/99	13:40		BTOX-M		X			2	

Cooler Temp = 1.2°C (large cooler)
Cooler Temp = 0.5°C (small cooler)

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Katherine Nozarty	10/5/99	1725						
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Karen Dorsey	10/6/99	10:00						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SL LOG NO.	LABORATORY REMARKS:
			[ ] YES [ ] NO			

ORIGINAL

CHAIN OF CUSTODY RECORD

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

Project No.: 648B
Project Name: Sauget Area I - Dead Creek
Project Location: Sauget/Cahokia, Ill
DATE: 10/6/99
SAMPLERS: Chomizo, K. Fogarty

SAMPLE ID	Date	Comp.	Time Grab	Station Locations	No. of Containers	Analyses Required: Bioassay (see note)					NOTES
E-1	10/6/99	✓	9:30	Dead Creek Sed. E	2	X					
E-2	↓	✓	9:05	↓	2	X					
E-3		✓	10:10		2	X					
BP-1			11:30	Borrow Pit	2	X					
BP-1 (Dup)			11:30	↓	2	X					
BP-3	↓		10:30		2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Kathleen Fogarty	10/6/99	1900	Karen Dowey	10/7/99	10:20
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time

Remarks: Note ① H. azteca/ C. tentans acute/ chronic sediment toxicity tests

Laboratory: Aquatech
Phone:
Contact Person: Phil. Downey

Via Fedex in 3 coolers

Cooler #1 Temp = 3.1°C - 834E5
Cooler #2 Temp = 3.2°C - PAGE 1 OF 1 BP1, BP1 Dup
Cooler #3 Temp = 2.5°C - E1 + E3

CHAIN OF CUSTODY RECORD

Project No.: 6478 B

Project Name: Dead Creek - Sauget Area I

Project Location: Sauget/Cahokia, Ill

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

DATE: 10/7/99

SAMPLERS: C. Menzie, K. Fogarty

SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	[illegible]					NOTES
BD-2	10/7/99	9:30		Borrow Pit	2	X					C1 C1
F-1	↓	15:00		Dead Creek - Sediment	2	X					C2 C2
F-2	↓	16:10		↓	2	X					C1 C2
F-3	↓	10:45		↓	2	X					C1 C2

Cooler 1 2.3°C
Cooler 2 2.7°C

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine A Fogarty	10/7/99	15:00	Phil Downey	10/8/99	10:30

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

Remarks: Sent in 2 coolers via Fedex

000018

CHAIN OF CUSTODY RECORD

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

Project No.: 648B
Project Name: Dead Creek - Sauget Area I
Project Location: Sauget-Cahokia, Ill.

DATE: 10/8/99

SAMPLERS: C. Menzie, K. Fogarty

SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	Analyses Required: [illegible]					NOTES
PDC-1	10/8/99	9:30		Prairie du Pont Creek	2	X					
PDC-2	↓	11:30		" " "	2	X					
Ref-1	↓	16:30		Ref. creek	2	X					

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fogarty	10/8/99	15:30			
Relinquished By: (Signature)	10/9/99	10:30	Received By: (Signature) J. [illegible]		
Relinquished By: (Signature)			Received By: (Signature)		

Laboratory: Aquatech

Phone:

Contact Person: Phil Downey

Remarks:
2 coolers via Fedex
Shipping bill No
811399409571

Cooler #1 1° C
Temp #2 3.1° C

PAGE 1 OF 1

000019

CHAIN OF CUSTODY RECORD

Project No.: 648B
Project Name: Dead Creek - Sauget Area I
Project Location: Sauget / Cahokia, Ill.

MENZIE-CURA & ASSOCIATES, INC.
1 COURTHOUSE LANE, SUITE 2
CHELMSFORD, MA 01824
TEL: 978/453-4300 FAX: 978/453-7260

DATE: 10/9/99
SAMPLERS: C. Menzie, K. Fogarty

	SAMPLE ID	Date	Time Comp.	Grab	Station Locations	No. of Containers	Analyses Required: [illegible]					NOTES
8501	Ref a-2	10/9/99	10:30	✓	Reference Borrow Pit	2	✓					
												Comp [illegible]

Relinquished By: (Signature)	Date	Time	Received By: (Signature)	Date	Time
Katherine Fogarty	10/9/99	1230			

Remarks: Sent via US Air Counter to Counter

Laboratory: Aquatech
Phone:
Contact Person: Phil Downey

000020

APPENDIX C

Midge (*Chironomus tentans*) Chronic Toxicity Test
Day 20 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3186 / 3189
	Test Start: October 19, 1999	Day 20: November 8, 1999

Sample	Repl.	Initial # Larvae	# Alive	11/8/99 Init.	Larvae preserved? Y / N	Crucible #	# Weighed	Ashed Pan Wt.	Ashed Pan Wt. + Larval Dry Wt.	Ashed Pan and Ashed Larvai Wt.
12548	I	12	① ~~5P 5L~~ 3P 9L	TM	Y	1	11	2238.99	2,267.44	2,243.55
	J	12	0P 7L	TM	Y	2	7	2120.34	2,142.36	2,123.31
	K	12	1P 6L	TM	Y	3	6	2385.96	2,408.08	2,388.36
	L	12	1P 4L	TM	Y	4	4	2286.61	2,306.17	2,287.91
12550	I	12	0P 0L	TM	Y	5	—	~~2313.28~~	—	—
	J	12	0P 11L	TM	Y	6	11	2129.85	2,167.44	2,136.97
very small *	K	12	0P 3L	TM	Y	7	3	2180.96	2,182.35	2,180.82
very small *	L	12	0P 1L	TM	Y	8	1	2491.01	2,491.36	2,490.86
12551	I	12	0P 8L	TM	Y	9	8	2282.84	2,323.33	2,292.54
Small →	J	12	0P 1L	TM	Y	10	1	2321.00	2,321.45	2,321.84
	K	12	0P 9L	TM	Y	11	9	2282.20	2,315.55	2,290.1
1 small 1 large →	L	12	0P 2L	TM	Y	12	2	2389.33	2,392.79	2,389.75
12552	I	12	5P 5L	TM	Y	13	5	2484.61	2,503.78	2,487.15
	J	12	0P 11L	TM	Y	14	11	2263.17	2,289.24	2,269.48
	K	12	3P 6L	TM	Y	15	6	2385.21	2,407.95	2,388.70
	L	12	0P 9L	TM	Y	16	9	2426.11	2,453.63	2,432.17
12592	I	12	0P 1L	TM	Y	17	1	2444.71	2,446.30	2,444.62
one body 11/8 JG cast found →	J	12	0P 7L	TM	Y	18	7	2174.02	2,192.47	2,176.60
(8 survive)	K	12	1P 8L	TM	Y	19	8	2377.44	2,403.31	2,~~4~~380.39 JG
	L	12	0P 7L	TM	Y	20	7	2380.32	2,397.21	2,382.15

Date / Time / Init. Larvae in oven: 11/22/99 17:45 TM Date / Time / Init. Larvae out of oven: 11/23/99 14:45 JG Init. 2000.01

Date / Time / Init. Larvae in furnace: 11/23/99 15:00 JG Date / Time / Init. Larvae out of furnace: /

Balance QC: Initial (20 mg = 2000.03mg) Final (20 mg = 2000.03mg) Balance Asset #:

Date/time In Temp(°C) Init. Date/time out Temp(°C) 79°C Init.

Comments:

Reviewer: [signature] Date: 12/21/99. P = pupa L = larva

ctday20doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

① Correction TM 11/8/99

000321

Midge (*Chironomus tentans*) Chronic Toxicity Test
Day 20 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3186 / 3189
	Test Start: October 19, 1999	Day 20: November 8, 1999

Sample	Repl.	Initial # Larvae	# Alive	11/8/99 Init.	Larvae preserved? Y / N		# Weighed	Ashed Pan Wt.	Ashed Pan Wt. + Larval Dry Wt.	Ashed Pan and Ashed Larval Wt.
12593	I	12	0P 5L	TM	Y	21	5	2300.33	2,318.30	2,302.13
	J	12	2P 3L	TM	Y	22	3	~~2421.67~~	2,427.55	2,422.12
	K	12	0P 5L	TM	Y	23	5	~~23~~ 2306.47	2,317.83	2,307.51
	L	12	2P 2L	TM	Y	24	2	2301.54	2,305.34	2,301.83
12609	I	12	0P 11L	TM	Y	6	11	2,129.87	2,146.97	2,131.58
	J	12	0P 8L	TM	Y	7	8	2,180.93	2,205.14	2,184.15
	K	12	0P 5L	TM	Y	8	5	2,490.99	2,509.45	2,492.85
	L	12	0P 2L	TM	Y	9	2	2,282.83	2,288.60	2,283.28
	I	12			Y					
	J	12			Y					
	K	12			Y					
	L	12			Y					
	I	12			Y					
	J	12			Y					
	K	12			Y					
	L	12			Y					
	I	12			Y					
	J	12			Y					
	K	12			Y					
	L	12			Y					

Date / Time / Init. Larvae in oven: 11/26 16:45 Date / Time / Init. Larvae out of oven: 11/27 15:00 JG
Date / Time / Init. Larvae in furnace: 11/27 15:15 Date / Time / Init. Larvae out of furnace:
Balance QC: Initial (20 mg = 2000.07) Final (20 mg = 2000.06) Balance Asset #:
Date/time In 11/26 16:45 Temp(°C) 80 Init. JG Date/time out 11/27 15:00 Temp(°C) 80 Init. JG
Comments:

Reviewer: [signature] Date: 12/21/99
ctday20doc
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31	
12548 A	# Males emerged	1			1			1					
	Male Time to Mortality (days)	8d 11/16 11/11			1d (11/13)			6d 11/21					
	# Females emerged			1					1 1			1	
	Females Time to Mortality (days)			2d 11/13					2d 11/18 5d 11/21			5d 11/24	
	Cumulative number emerged	1		2	3			4	6			7	
	# Pairings			1 w/ 548A ♂					w/ 548F ♂ | w/ 548F ♂			w/548D ♂ 11/17	
	# Egg Case									1°			1°
	# Eggs / Time to hatch / # hatched									1,650 ≃70 unhatched 11/23	24 unhatched 11/24		1,414 ~100 unhatch 11/26 ~12 unhatd 11/27
12548 B	# Males emerged						1 D						
	Male Time to Mortality (days)						0d 11/14						
	# Females emerged												
	Females Time to Mortality (days)												
	Cumulative number emerged						1						
	# Pairings												
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
12548 C	# Males emerged											1 dead 1 alive	
	Male Time to Mortality (days)											0d 11/19 5d 11/23	
	# Females emerged						1						
	Females Time to Mortality (days)						3d 11/17						
	Cumulative number emerged						1					3	
	# Pairings						w/548E ♂ 11/13						
	# Egg Case								1°				
	# Eggs / Time to hatch / # hatched								616 39 unhatched 11/22				
	Init./Date (1999)	11/9 JG	11/10	11/11 JM	11/12 JC	11/13	11/14 JG	11/15 JG	11/16 JM	11/17 JM	11/18 JM	11/19 JG	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31	Day 32
12548 D	# Males emerged				1			1 1 (second	1	1			
	Male Time to Mortality (days)				3d 11/15			4d 4d	Not recorded	6d 11/23			
	# Females emerged												1 1
	Females Time to Mortality (days)												
	Cumulative number emerged				1			4	5	6			~~6~~ 8 JG
	# Pairings												w/ 548F 11/16 w/ 548 [illegible] 11/20
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
12548 E	# Males emerged					1					1		1
	Male Time to Mortality (days)					4d 11/17					5d 11/23		
	# Females emerged									1 crushed	1		1
	Females Time to Mortality (days)									4d 11/21	3d 11/21		
	Cumulative number emerged					1				3	5		7
	# Pairings									w/548F♂	1		1
	# Egg Case											1° 1,795	1
	# Eggs / Time to hatch / # hatched											~200 unhatched ① ~150 unhatched	11/2
12548 F	# Males emerged				1	1 1		1 1	1 1	1 1			
	Male Time to Mortality (days)				5d 11/17	5d 11/18 2d 11/15		5d 11/21 6d 11/21	4d 11/20 7d 11/23	4d 11/21 4d 11/21			
	# Females emerged											1	
	Females Time to Mortality (days)											4d 11/23	
	Cumulative number emerged					3		5	7	9		10	
	# Pairings											w/548C♂	
	# Egg Case												1°
	# Eggs / Time to hatch / # hatched												1,770 ~43 unh 11/25
	Init./Date (1999)	11/9	11/10	11/11	11/12 JG	11/13 JG	11/14	11/15 JM	11/16 JM	11/17 JM	11/18 JM	11/19 JG	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

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① Female dead 11/21 only partial egg case deposited 11/21 JM

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12548 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [signature] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/~~20~~ 19/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12548 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		7									
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 B	# Males emerged		1	1			1	1				
	Male Time to Mortality (days)		4d 11/25	7d 11/29			3d 11/28	6d 12/2				
	# Females emerged			1								
	Females Time to Mortality (days)			4d 11/26								
	Cumulative number emerged		2	4			5	6				
	# Pairings			1								
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 C	# Males emerged		1			1D 1						
	Male Time to Mortality (days)		4d 11/25			0d 11/24 2d 11/26						
	# Females emerged			1 1		1						
	Females Time to Mortality (days)			3d 11/25 / 4d 11/26		$\boxed{\text{Not recorded}}$						
	Cumulative number emerged		4	6		9						
	# Pairings			w/548 A 11/22 w/548C 11/24		1						
	# Egg Case				1°	1° 1,134 11/24 0 hatch		1° very small ~39				
	# Eggs / Time to hatch / # hatched				1,663 ~250 un. 11/29	~200 unh 11/30		0% hatch 12/2 0% hatch 12/3		egg case disintegrating		
	Init./Date (1999)	11/20	11/21 JM	11/22 JM	11/23 JG	11/24 JM	11/25 JM	11/26 JG	11/27	11/28 TM	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99 c:\days32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000026

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 ①
12548 D	# Males emerged					1						
	Male Time to Mortality (days)					1d 11/25						
	# Females emerged	1	1									
	Females Time to Mortality (days)	3d 11/23	3d 11/23									
	Cumulative number emerged	8 ~~7~~ JG	~~7~~ 8 JG			9						
	# Pairings	w/548 F 11/16	w/548 NA 2 11/19									
	# Egg Case				1° 882	0 unhatched 11/29 2 unhatched 11/30						
	# Eggs / Time to hatch / # hatched				1° ~~192~~	0% hatch 11/29 0% hatch 11/30						
12548 E	# Males emerged	1										
	Male Time to Mortality (days)	6d 11/26										
	# Females emerged	1										
	Females Time to Mortality (days)	2d 11/22										
	Cumulative number emerged		7									
	# Pairings	from 11/17 pair 1										
	# Egg Case		1° 116	1° 1,680 ~60 unh. 11/27 13 unhatched 11/28								
	# Eggs / Time to hatch / # hatched		very small 0% hatch 11/27									
12548 F	# Males emerged		0% hatch 11/28		1							
	Male Time to Mortality (days)				3d 11/26							
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		10		11							
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22 JM	11/23 JG	11/24 JM	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

① Test Day correction 11/30/99

Review: ______ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000327

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

1

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12548 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 H	# Males emerged						1					
	Male Time to Mortality (days)						3d 11/28					
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21	11/22	11/23	11/24	11/25 TM	11/26	11/27	11/28 TM	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments: 1. Test day correction 11/30/99

Review: [signature] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000028

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12548 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									TM		
	# Pairings									12/9		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 B	# Males emerged											
	Male Time to Mortality (days)									0L		
	# Females emerged									0P		
	Females Time to Mortality (days)									TM		
	Cumulative number emerged									12/9		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 C	# Males emerged	1										
	Male Time to Mortality (days)	5d, 12/6								0L		
	# Females emerged									0P		
	Females Time to Mortality (days)									TM		
	Cumulative number emerged									12/9		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1 TM	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are no surviving. P = pupa

Review: [signature] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12548 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									12/9		
	# Pairings									TM		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									1P		
	Cumulative number emerged									12/9		
	# Pairings									TM		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged		1							0L		
	Females Time to Mortality (days)		2d 12/4							0P		
	Cumulative number emerged									12/9		
	# Pairings		w/ 5480 12/2							TM		
	# Egg Case			1° 1,789								
	# Eggs / Time to hatch / # hatched			6 unh 12/9 1 unh. 12/10								
	Init./Date (1999)	12/1	12/2 TM	12/3 JG	12/4	12/5	12/6	12/7	12/8	12/9	12/10 JG	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12548 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									12/9		
	# Pairings									TM		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12548 H	# Males emerged	1										
	Male Time to Mortality (days)	8d 12/9								1L		
	# Females emerged									1P		
	Females Time to Mortality (days)									12/9		
	Cumulative number emerged									TM		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1 TM	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9 TM	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000031

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12550 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12550 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are no' surviving. P = pupa

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12550 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged						1			1		
	Females Time to Mortality (days)						6d 11/20			7d 11/24		
	Cumulative number emerged						1			2		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: ________ Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12550 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)										OL	
	Cumulative number emerged										OP	
	# Pairings										11/29 TM	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/29 TM	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any ~~pupae~~ which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Review: ______ Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

(1)

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12550 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										0L	
	Females Time to Mortality (days)										0P	
	Cumulative number emerged										11/29 TM	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										0L	
	Females Time to Mortality (days)										0P	
	Cumulative number emerged										11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										0L	
	Females Time to Mortality (days)										0P	
	Cumulative number emerged										11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Test Day Correction 11/30/99

Review: JG Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000036

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12550 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged		2								11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12550 H	# Males emerged											
	Male Time to Mortality (days)										OL	
	# Females emerged										OP	
	Females Time to Mortality (days)										11/29 JG	
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Comments:

① Test day correction J 11/30/99

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000037

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12551 A	# Males emerged				1							
	Male Time to Mortality (days)				5d 11/17							
	# Females emerged					1 1.						
	Females Time to Mortality (days)					4d 11/17 2d 11/15						
	Cumulative number emerged					3						
	# Pairings					w/551 1♂ 11/12						
	# Egg Case						1° EST. 1,254					
	# Eggs / Time to hatch / # hatched						12 unhatched 100% 11/21					
12551 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12 JG	11/13 JG	11/14 JG	11/15 JM	11/16	11/17 JM	11/18	11/19

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ________ Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12551 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12551 G	# Males emerged					1 dead		111	1	1		
	Male Time to Mortality (days)							4d 11/19 5d 11/20 5d 11/22	5d 11/21	6d 11/23		
	# Females emerged										1	
	Females Time to Mortality (days)										2d 11/20	
	Cumulative number emerged							4	5	6	7	
	# Pairings										w/ 551G ♂ 11/17	
	# Egg Case											1° 2,077
	# Eggs / Time to hatch / # hatched											≃317 unhatched 11/25 ≃200 11/26
12551 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13 JG	11/14 JG	11/15 JG	11/16 JM	11/17 JG	11/18 JM	11/19 JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: _________ Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12551 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										1L	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged		3								11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/29 TM	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/29 TM	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L= larva

Review: ________ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

①

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12551 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)										OL	
	Cumulative number emerged										OP	
	# Pairings										11/29 JM	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 F	# Males emerged											
	Male Time to Mortality (days)										OL	
	# Females emerged										OP	
	Females Time to Mortality (days)										11/29 JG	
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

① Test day correction J 11/30/99

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000042

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 ①
12551 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged		7								11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12551 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/29 JG	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Comments:

① Test day correction J 11/26/99

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12552 A	# Males emerged		1	2 [1:1]		1 crushed			1			
	Male Time to Mortality (days)		5d 11/15	6d 6d 11/17 11/17		0d 11/13			7d 11/23			
	# Females emerged						1	1			1	
	Females Time to Mortality (days)						Not recorded	4d 11/19			4d 11/22	
	Cumulative number emerged		1	3		4	5	6	7		8	
	# Pairings						w/552E ♂	w/552F ♂ 11/13			w/552 E ♂ 11/16	
	# Egg Case										w/552E 11/18 (11/24 TM)	
	# Eggs / Time to hatch / # hatched											
12552 B	# Males emerged		2 (1:1)		1							
	Male Time to Mortality (days)		6d 6d 11/16 11/16		6d 11/18							
	# Females emerged					A 1 1 B					1	
	Females Time to Mortality (days)					3d 11/16 5d 11/18					4d 11/22	
	Cumulative number emerged		2			4	~~w/552D ♂~~		Bot w/ 552C ♂ 11/12		6	
	# Pairings					w/552F ♂ 11/13					w/552E ♂	11/21 1°
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 C	# Males emerged				1	1 1						
	Male Time to Mortality (days)				6d 11/18	3d 3d 11/16 11/16						
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged					3						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10 JM	11/11 JM	11/12 JG	11/13 JG	11/14 JG	11/15 JG	11/16 JM	11/17 JM	11/18 JM	11/19 JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ________ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays21-31

000044

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12552 D	# Males emerged			1	-	1						
	Male Time to Mortality (days)			8d 11/19	escaped	5d 11/18						
	# Females emerged				1 1					1		
	Females Time to Mortality (days)				1d 11/13					4d 11/21		
	Cumulative number emerged			1		4				5		
	# Pairings				w/ 552C ♂ w/552B ♂					w/552G ♂		
	# Egg Case					1° Est. 1,285						
	# Eggs / Time to hatch / # hatched					~12 unhatched 11/19 100%	5 unhatched 11/20 100% JG					
12552 E	# Males emerged		1		1 1	1	1 1	~~1~~ ①	1		1	
	Male Time to Mortality (days)		9d 11/19		6d 11/18 6d 11/18	6d 11/19	1d 11/15 Not recorded		5d 11/21		5d 11/23	
	# Females emerged						1			1		
	Females Time to Mortality (days)						1d 11/15			3d 11/20		
	Cumulative number emerged		1			4	~~6~~ 7 JG	~~8~~ JM	8		10	
	# Pairings						1			w/552G ♂ 11/16		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 F	# Males emerged					1 1 JG	1					
	Male Time to Mortality (days)					2d 11/15 5d 11/18	1d 11/15					
	# Females emerged						1	1		1		
	Females Time to Mortality (days)						4d 11/18	4d 11/19		5d 11/22		
	Cumulative number emerged					2	4	5		6		
	# Pairings						1	w/552E ♂ 11/13		w/552A ♂ 11/16		
	# Egg Case						0 JM small	470 1° small			1° ~1392	
	# Eggs / Time to hatch / # hatched							100% 11/21 JG			11 unhatched 11/24 7 unhatched 11/25	
	Init./Date (1999)	11/9	11/10 JM	11/11 JM	11/12 JG	11/13 JG	11/14 JG	11/15 JM	11/16 JM	11/17 JG	11/18 JM	11/19 JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

① correction JM 11/15

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays21-31

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12552 G	# Males emerged		1D	2(1 1					1	1		
	Male Time to Mortality (days)		0 11/10	5d 11/16 8d 11/19					4d 11/20	6d 11/23		
	# Females emerged						1 1					
	Females Time to Mortality (days)						9d 11/18 1d 11/16					
	Cumulative number emerged		1	3			5		6	7		
	# Pairings						2w/552 B♂ 11/12					
	# Egg Case							1° 902				
	# Eggs / Time to hatch / # hatched							0 hatch 902 unhatched 11/24				
12552 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged			1								1
	Females Time to Mortality (days)			5d 11/16								1d 11/20
	Cumulative number emerged											2
	# Pairings			1 w/ 552 ♂A								
	# Egg Case						1° EST. 1,508					
	# Eggs / Time to hatch / # hatched						0% hatch 11/21					
	Init./Date (1999)	11/9	11/10 JM	11/11 JM	11/12	11/13	11/14 JG	11/15 JG	11/16 JM	11/17 JG	11/18	11/19 YC

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [signature] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays21-31

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12552 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		8									
	# Pairings		11/18♀ w/552E♂ 11/18									
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		6									
	# Pairings											
from 11/18 pair	# Egg Case		1° 516									
	# Eggs / Time to hatch / # hatched		0%hatch 11/27 disintegrated									
12552 C	# Males emerged		0%hatch	11/28				1				
	Male Time to Mortality (days)							9d 12/5				
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		3					4				
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22	11/23	11/24	11/25	11/26 JG	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: G Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

(1.)

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12552 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		5									
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		10									
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		6									
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

(1) Test Day Correction

Review: J Date: 12/21/99 11/30/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 ②
12552 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		7									
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 H	# Males emerged											
	Male Time to Mortality (days)			① JM								
	# Females emerged			~~1D~~								
	Females Time to Mortality (days)			~~0d~~								
	Cumulative number emerged		2	~~3~~								
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22 JM	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

① Wrote in wrong ^correction^ place JM 11/22

② Test Day correction TJ 11/30/99

Review: [signature] Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12552 A	# Males emerged											
	Male Time to Mortality (days)			OL								
	# Females emerged			OP								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 B	# Males emerged											
	Male Time to Mortality (days)			OL								
	# Females emerged			OP								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 C	# Males emerged											
	Male Time to Mortality (days)			OL								
	# Females emerged			OP								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3 [illegible]	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [illegible] Date: 12/21/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12552 D	# Males emerged											
	Male Time to Mortality (days)			0L								
	# Females emerged			0P								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 E	# Males emerged											
	Male Time to Mortality (days)			0L								
	# Females emerged			0P								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 F	# Males emerged											
	Male Time to Mortality (days)			0L								
	# Females emerged			0P								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3 YS	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays~~32-42~~ 43-53

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12552 G	# Males emerged											
	Male Time to Mortality (days)			0L								
	# Females emerged			0P								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12552 H	# Males emerged											
	Male Time to Mortality (days)			0L								
	# Females emerged			0P								
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3 JS	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12592 A	# Males emerged						1					1
	Male Time to Mortality (days)						4d 11/18					5d 11/24
	# Females emerged								1		1	
	Females Time to Mortality (days)								3d 11/19		7d 11/25	
	Cumulative number emerged						1		2		3	4
	# Pairings								w/592E ♂ 11/14		w/592E	
	# Egg Case											1
	# Eggs / Time to hatch / # hatched											1,407 153 unhatched 11/25 50 unhatched 11/26
12592 B	# Males emerged				1							
	Male Time to Mortality (days)				3d 11/15							
	# Females emerged								1	1 dead		
	Females Time to Mortality (days)								3d 11/19	0d 11/17		
	Cumulative number emerged				1				2	3		
	# Pairings								w/ 592C ♂ 11/16			
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 C	# Males emerged				1			1	1			1
	Male Time to Mortality (days)				3d 11/15			3d 11/18	2d 11/18			4d 11/23
	# Females emerged											1
	Females Time to Mortality (days)											3d 11/22
	Cumulative number emerged				1			2	3			5
	# Pairings											1
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12 JG	11/13	11/14 JG	11/15 JM	11/16 JM	11/17 JG	11/18 JM	11/19 JM

1 1

6 JG

w/ 592E ♂

w/ 592 ♂

11/20

Emergence scoring: Record any pupae which die (□) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31	Day 32
12592 D	# Males emerged							1				1 dead	
	Male Time to Mortality (days)							3d 11/18				0d 11/19	
	# Females emerged				1								
	Females Time to Mortality (days)				3d 11/15								
	Cumulative number emerged							2				3	
	# Pairings				w/592E ♂								
	# Egg Case					JG							①
	# Eggs / Time to hatch / # hatched												Data transferred to next page
12592 E	# Males emerged				1		1		1		1		
	Male Time to Mortality (days)				5d 11/17		4d 11/18		3d 11/19		5d 11/23		4d 11/24
	# Females emerged					1	1			1			
	Females Time to Mortality (days)					2d 11/15	4d 11/18			5d 11/22			
	Cumulative number emerged					2	4		5	~~5~~ 6	~~6~~ 7		~~7~~ 8
	# Pairings					w/592C ♂ 11/12	1 w/592D ♂			w/592D ♂ 11/15			w/592A ♂ 11/19
	# Egg Case						1 0 EST. 623 Small	10 1,020					
	# Eggs / Time to hatch / # hatched						6 unhatched 100% 11/21	18 unhatched 11/22					
12592 F	# Males emerged												
	Male Time to Mortality (days)												
	# Females emerged												
	Females Time to Mortality (days)												
	Cumulative number emerged												
	# Pairings												
	# Egg Case												
	# Eggs / Time to hatch / # hatched							NB					
	Init./Date (1999)	11/9	11/10	11/11	11/12 JG	11/13 JG	11/14 JG	11/15 JM	11/16 JM	11/17 JM	11/18 JM	~~11/19~~ JG	11/20 JG

Emergence scoring: Record any pupae which die (P) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

① Data were transcribed to new data sheet (begins Day 32 observations). J 12/22/99

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays21-31

000054

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12592 G	# Males emerged								1.			1 ~~1~~ JG
	Male Time to Mortality (days)								3d 11/19			3d 11/22
	# Females emerged										1	1
	Females Time to Mortality (days)										3d 11/21	4d 11/23
	Cumulative number emerged											4 ~~5~~ JG
	# Pairings											1 w/592A 81/19
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 H	# Males emerged										1D	1 1
	Male Time to Mortality (days)										0 11/18	Not recorded
	# Females emerged								1			1
	Females Time to Mortality (days)								2d 11/18			Not recorded
	Cumulative number emerged											4
	# Pairings								1 w/592 C 11/16			1
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16 JM	11/17	11/18 JM	11/19 JM

11/20 → 10
1,078
~209 unhatched 11/26
unhatched 11/27
~175

11/20 JG

Emergence scoring: Record any pupae which die ( ) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12592 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged	1	1									
	Females Time to Mortality (days)	3d 11/23	6d 11/26									
	Cumulative number emerged	w/592E ♂	6									
11/20 ♀ + w/592E♂	# Pairings	11/20 ♀ w/592H♂										
	# Egg Case	(B)	1° (A) 1°									
	# Eggs / Time to hatch / # hatched	~90 unh. 11/27 76 unhatched 11/28	1,133 1,482	~~400~~ 130 unhatched 67 unhatched 11/28								
12592 B	# Males emerged				1							
	Male Time to Mortality (days)				3d 11/26							
	# Females emerged		1D									
	Females Time to Mortality (days)		0d 11/21									
	Cumulative number emerged		4		5							
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 C	# Males emerged		~~0~~ 1 JM				1					
	Male Time to Mortality (days)						1d 11/26					
	# Females emerged		1				1					
	Females Time to Mortality (days)		3d 11/24				2d 11/27					
	Cumulative number emerged		6				8					
	# Pairings		w/592D ♂ 11/21				1	592C ♂ 11/25 w/592G ♂ 11/26				
	# Egg Case								1°			
	# Eggs / Time to hatch / # hatched								700 ~30 unhatched died 12/3 ~20 unh. 12/4			
	Init./Date (1999)	11/20	11/21 JM	11/22	11/23 JG	11/24	11/25 JM	11/26 JG	11/27 JG	11/28	11/29	11/30 JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

*Correction JM 11/21

Review: ____ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000056

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 ①
12592 D	# Males emerged		1									
	Male Time to Mortality (days)		3d 11/24									
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		4									
	# Pairings		~~11/15~~									
	# Egg Case		~~1~~									
	# Eggs / Time to hatch / # hatched											
12592 E	# Males emerged	1										
	Male Time to Mortality (days)	4d 11/24										
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		8									
	# Pairings	11/17♀ w/ 592F										
	# Egg Case		1°									
	# Eggs / Time to hatch / # hatched		1,447 ~200 un. ~200 un.	11/27 11/28								
12592 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

① Test Day Correction 11/30/99

Review: ________ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000057

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1.)
12592 G	# Males emerged		1			1		1			1	
	Male Time to Mortality (days)		7d 11/28			9d 12/3		3d 11/29			6d 12/5	
	# Females emerged			1	1							
	Females Time to Mortality (days)			3d 11/25	3d 11/26							
	Cumulative number emerged		5	6	7	8		9			10	
11/19 ♀ w/ 592 ♂ 11/21 JM 11/22	~~# Pairings~~			~~w/592♀~~ ♂ 11/22	w/592 13♂							
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 H	# Males emerged	1 1										
	Male Time to Mortality (days)	5d 11/25 5d 11/25										
	# Females emerged	1		1D								
	Females Time to Mortality (days)	4d 11/24		0d 11/22								
	Cumulative number emerged		5	6								
	# Pairings	11/20 pair										
	# Egg Case			1°								
	# Eggs / Time to hatch / # hatched			530 small 115 unh. 11/28								
	Init./Date (1999)	11/20	11/21 JM	11/22 JM	11/23 JG	11/24 JM	11/25 JM	11/26 JG	11/27	11/28 TM	11/29 JG	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

(1.) Test Day correction J 11/30/99

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12592 A	# Males emerged						1 large L				-	
	Male Time to Mortality (days)						0P					
	# Females emerged						12/6 JG					
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged						0 L					
	Females Time to Mortality (days)						0P					
	Cumulative number emerged						12/6 JG					
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged						0L					
	Females Time to Mortality (days)						0P					
	Cumulative number emerged						12/6 JG					
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6 JG	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99

ctdays~~32-42~~ 43-53

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12592 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged						0L					
	Females Time to Mortality (days)						0P					
	Cumulative number emerged						12/6 JG					
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged						0L					
	Females Time to Mortality (days)						0P					
	Cumulative number emerged						12/6 JG					
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged						0L					
	Females Time to Mortality (days)						0P					
	Cumulative number emerged						12/6 JG					
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6 JG	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

000060

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12592 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged						0L					
	Females Time to Mortality (days)						0P					
	Cumulative number emerged						12/6 JG					
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12592 H	# Males emerged											
	Male Time to Mortality (days)							①				
	# Females emerged						13 small L					
	Females Time to Mortality (days)						0P					
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6 JG	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

① Larvae believed to be from egg case that may have been deposited in replicate test beaker
JG

Review: JG Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays~~32-42~~ 43-53 G

000061

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31	
12593 A	# Males emerged					1		1		1		1	
	Male Time to Mortality (days)					1d 11/14		2d 11/17		2d 11/19		7d 11/26	
	# Females emerged					1							
	Females Time to Mortality (days)					4d 11/17							
	Cumulative number emerged					2		3		4		5	
	# Pairings					1	w/593E ♂ 11/13						
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
12593 B	# Males emerged		1D		1					1			
	Male Time to Mortality (days)		0d 11/10		1d 11/13					5d 11/22			
	# Females emerged						1	1					
	Females Time to Mortality (days)						4d 11/18	2d 11/17					
	Cumulative number emerged		1		2		3	4		5			
	# Pairings						w/593E ♂ 11/13	w/593 ♂					
	# Egg Case									1° 660 1 240			
	# Eggs / Time to hatch / # hatched									0 hatch 0% hatch 11/23	0 hatch 0% hatch 11/23	✱	
12593 C	# Males emerged			1									
	Male Time to Mortality (days)			7d 11/18									
	# Females emerged				1	1							1
	Females Time to Mortality (days)				5d 11/17	1d 11/14							1d 11/21
	Cumulative number emerged			1		3							4
	# Pairings				w/593 G ♂	w/593E ♂ 11/13							w/593F ♂ 11/17
	# Egg Case					1° EST. 1,060							
	# Eggs / Time to hatch / # hatched					5 unhatched 11/20 100%							
	Init./Date (1999)	11/9	11/10 MM	11/11 JM	11/12 JG	11/13 JG	11/14 JG	11/15 JG	11/16	11/17 JM	11/18 JA	11/19 JG	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

✱ both 11/17 cases (12593B) appeared to have a fungus! 11/23 JG

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000032

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31	
12593 D	# Males emerged						1D						
	Male Time to Mortality (days)						3d 11/14						
	# Females emerged								1			1	1escaped
	Females Time to Mortality (days)								4d 11/20			2d 11/21	
	Cumulative number emerged								2			4	
	# Pairings								w/593 F ♂			w/593A ♂	
	# Egg Case										1° A52		
	# Eggs / Time to hatch / # hatched										11/24 ≈ 300 unhatched still ~~un~~hatching		
12593 E	# Males emerged		1 1D		1 male escaped	1 1	not located						
	Male Time to Mortality (days)		3d 11/13 0d			7d 11/20							
	# Females emerged												1
	Females Time to Mortality (days)												4d 11/24
	Cumulative number emerged		2			5							~~w~~/
	# Pairings												w/~~593B~~ ♂ 11/17
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
12593 F	# Males emerged			1escaped			1		1	1			
	Male Time to Mortality (days)						4d 11/18		5d 11/21	6d 11/23			
	# Females emerged						1						
	Females Time to Mortality (days)						3d 11/17						
	Cumulative number emerged			1			3		4	5			
	# Pairings						1						
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
	Init./Date (1999)	11/9	11/10 JM	11/11 JM	11/12 JG	11/13 JG	11/14 JG	11/15	11/16 JM	11/17 JG	11/18 JM	11/19 JG	11/20 JG

Emergence scoring: Record any pupae which die (before emergence. D = dead for flies which emerge but are not surviving. ' = pupa

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3322	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12593 G	# Males emerged				1							1
	Male Time to Mortality (days)				~~5d~~ JG 6d 11/18							5d 11/24
	# Females emerged							1		1		
	Females Time to Mortality (days)							4d 11/19		2d 11/19		
	Cumulative number emerged							2		3		4
	# Pairings							~~w/593A ♂~~		w/593A ♂ 11/17	w/593 B ♂ 11/17	
	# Egg Case										1 ~1688	
	# Eggs / Time to hatch / # hatched										~600 unhatched 11/24 113 unhatched 11/25	
12593 H	# Males emerged			1 Alive 1 Dead				1		1		
	Male Time to Mortality (days)			9d 11/20				5d 11/20		11/23 6d		
	# Females emerged									1		
	Females Time to Mortality (days)									6d 11/23		
	Cumulative number emerged			2				3		5		
	# Pairings									1		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11 JM	11/12 JG	11/13	11/14	11/15 JG	11/16	11/17 JG	11/18 JM	11/19 JM 11/20 JG

Emergence scoring: Record any pupae which die (... before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: J Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000364

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12593 A	# Males emerged				1							
	Male Time to Mortality (days)				5d 11/28							
	# Females emerged				1							
	Females Time to Mortality (days)				5d 11/28							
	Cumulative number emerged		5		7							
	# Pairings	11/19 ♀ w/593C♂			1							
	# Egg Case		~~1~~ JM			1 ~1822						
	# Eggs / Time to hatch / # hatched					~140 unhatched 11/30 (*1)						
12593 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged							1				
	Females Time to Mortality (days)							3d 11/29				
	Cumulative number emerged		~~4~~ 6					7				
	# Pairings									11/26 ♀ w/5930C♂	11/27	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12593 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					1	1					
	Females Time to Mortality (days)					5d 11/29	5d 11/30					
	Cumulative number emerged		4			5	6					
	# Pairings					w/593H 11/23	w/593H 11/23			593C♀ 11/25 w/593G	11/28	
	# Egg Case						1 ~1660				1 ~1254	
	# Eggs / Time to hatch / # hatched						184 unh. 123 unh.	12/1 12/2			w/50 unhatched 68 unh. 12/5 12/6	
	Init./Date (1999)	11/20	11/21 JM	11/22	11/23 JG	11/24 JM	11/25 JM	11/26 JG	11/27	11/28 JM	11/29	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

(*1) Couldn't do day 7 count on 12/1 JM
egg case discarded 11/30
~~(Day 6 data used)~~
ok JG

Review: JG Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000065

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12593 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged		1									
	Females Time to Mortality (days)		6d 11/27									
	Cumulative number emerged		5									
	# Pairings		w/ 593F♂ 11/21									
from 11/19 pair	# Egg Case		1°	1°								
	# Eggs / Time to hatch / # hatched	~100 unh. 11/27	~400 small 34 unhatched	1,526 37 unh.	35 unh 11/28 11/29 11/28							
12593 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		7									
	# Pairings		1♀♂ w/ 593G 11/19									
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12593 F	# Males emerged		1									1
	Male Time to Mortality (days)		4d 11/25									4d 12/8
	# Females emerged						1					
	Females Time to Mortality (days)						5d 11/30					
	Cumulative number emerged		6				7					8
	# Pairings						w/593A 11/19		593F♂ 11/25 w/593G ♂ 11/27			
	# Egg Case									1°		
	# Eggs / Time to hatch / # hatched									1941 ~75 unhatched 15 unh.	12/5	12/4
	Init./Date (1999)	11/20	11/21 JM	11/22 JM	11/23	11/24	11/25 JM	11/26	11/27 CG	11/28 JM	11/29	11/30 TM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

① Test Day Correction J 11/30/99

Review: ______ Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12593 G	# Males emerged		1							1		
	Male Time to Mortality (days)		5d 11/26							4d 12/2		
	# Females emerged		1				1					
	Females Time to Mortality (days)		~~1~~ 5d 11/26				3d 11/28					
	Cumulative number emerged		6				7			8		
	# Pairings		1	① ~~[illegible]~~			w/ 5939A 11/23					
	# Egg Case			10								
	# Eggs / Time to hatch / # hatched			1,430 ~200 unh. 11/28 195 unh 11/29								
12593 H	# Males emerged				1							
	Male Time to Mortality (days)				5d 11/28							
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		5		6							
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22 JM	11/23 JG	11/24	11/25 JM	11/26	11/27	11/28 JM	11/29	11/30

②

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments: ① correction JM 11/22

② Test day correction J 12/20/99

Review: J Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12593 A	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12593 B	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12593 C	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ________ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12593 D	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12593 E	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12593 F	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6	12/7 JK	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [signature] Date: 12/21/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays~~32-42~~ 43-53

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12593 G	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12593 H	# Males emerged											
	Male Time to Mortality (days)							0L				
	# Females emerged							0P				
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6	12/7 [illegible]	12/8	12/9	12/10	12/11

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [illegible] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

000070

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31	
12609 A	# Males emerged								1		1		
	Male Time to Mortality (days)								1d 11/17		4d		
	# Females emerged										1 1		
	Females Time to Mortality (days)										4d 2d		
	Cumulative number emerged										4		
	# Pairings										1 w/6096		1°
	# Egg Case												775 p 11/30
	# Eggs / Time to hatch / # hatched											6 unhatched 11/27	128 unhatched 426 1 escaped
12609 B	# Males emerged												
	Male Time to Mortality (days)												
	# Females emerged												1
	Females Time to Mortality (days)												2d
	Cumulative number emerged												2
	# Pairings												w/6095 2
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
12609 C	# Males emerged								1		1 1		1
	Male Time to Mortality (days)								7d 11/23		4d 2d 11/22 11/23		2d 11/22
	# Females emerged												
	Females Time to Mortality (days)												
	Cumulative number emerged										~~2~~ 3		~~3~~ 4
	# Pairings												
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
	Init./Date (1999)	11/9	11/10	11/11 JM	11/12	11/13	11/14	11/15	11/16 JM	11/17 JM	11/18 JM	11/19	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31	
12609 D	# Males emerged												
	Male Time to Mortality (days)												
	# Females emerged												
	Females Time to Mortality (days)												
	Cumulative number emerged												
	# Pairings												
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
12609 E	# Males emerged								1			1 1	
	Male Time to Mortality (days)								5d			6d 11/25 6d 11/25	
	# Females emerged									~~1~~	1		
	Females Time to Mortality (days)										5d 11/23		
	Cumulative number emerged											4	
	# Pairings									~~w/609 E~~	w/609E		
	# Egg Case											10	
	# Eggs / Time to hatch / # hatched											1,252 79 unhatched 11/25 10 unhatched 11/26	
12609 F	# Males emerged						1					1	1
	Male Time to Mortality (days)						4d 11/18					6d 11/25	4d 11/[illegible]
	# Females emerged												
	Females Time to Mortality (days)												
	Cumulative number emerged						1					~~2~~	3
	# Pairings												
	# Egg Case												
	# Eggs / Time to hatch / # hatched												
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14 JG	11/15	11/16 [illegible]	11/17	11/18 [illegible]	11/19 JG	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [illegible] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000072

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12609 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12609 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: J Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12609 A	# Males emerged				1							
	Male Time to Mortality (days)				4d 11/27							
	# Females emerged				1							
	Females Time to Mortality (days)				3d 11/26							
	Cumulative number emerged		4		6							
from 11/18 pair	# Pairings				1							
	# Egg Case		1°									
	# Eggs / Time to hatch / # hatched		1,053 0% hatch 0% hatch 11/29	disintegrated 11/28								
12609 B	# Males emerged	1 escaped										
	Male Time to Mortality (days)											
	# Females emerged	1				1					1	
	Females Time to Mortality (days)	~~Not recorded~~ 2d 11/22				~~3d 11/27~~ 6d 11/30					3d 12/2	
	Cumulative number emerged		2			3					4	
	# Pairings	w/609F				w/609E 11/21		609B♂ 11/24 w/ 609C♂ 11/26	609B♂ 11/24 w/609F ♂ 11/27		w/609D ♂ 11/29	
	# Egg Case		1° 1,921							1° ~2083		
	# Eggs / Time to hatch / # hatched		~175 unhatched 11/27							0% hatch 12/4 disintegrating 0% hatch 12/5		
12609 C	# Males emerged	1	55 unhatched 11/24									
	Male Time to Mortality (days)	2d 11/22										
	# Females emerged			1			1				1	
	Females Time to Mortality (days)			8d 11/30			6d 12/1				4d 12/3	
	Cumulative number emerged	4	~~3~~	4			5				6	
	# Pairings			w/609E ♂ 11/24			w/609D ♂ 11/25			609C♀ w/609N 11/26	w/609F ♂ 11/29	
	# Egg Case					1° ~1253 ~210 unh. 11/30						1° 836
	# Eggs / Time to hatch / # hatched					(*1)						~350 unh 12/6 ~350 unh 12/1
	Init./Date (1999)	11/20 JG	11/21 JM	11/22 JM	11/23 JG	11/24 JM	11/25 JM	~~11/26~~ JG	11/27	11/28 JM	~~11/29~~ JG	~~11/30~~ JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

(*1) Couldn't do day 7 count of hatching egg case discarded 11/30

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000074

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1)
12609 D	# Males emerged					1	1				1	
	Male Time to Mortality (days)					1d 11/25	escaped 11/28				3d 12/2	
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged		~~1~~ 0 JM			1	2				3	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12609 E	# Males emerged		1 1st 1									
	Male Time to Mortality (days)		3d 11/24 1st 11/26									
	# Females emerged		1				1					
	Females Time to Mortality (days)		3d 11/24				5d 11/30					
	Cumulative number emerged		8				9					
	# Pairings		1				w/609 D 11/25	609E♂ 11/25 w/609P ♂ 11/26				
	# Egg Case			10					10 1,842			
	# Eggs / Time to hatch / # hatched			864 12 unhatched 11/28 7 unhatched 11/29					~180 unhatched 12/3 ~175 unhatched 12/4			
12609 F	# Males emerged								1		1	
	Male Time to Mortality (days)								6d 12/3		3d 12/2	
	# Females emerged					1						
	Females Time to Mortality (days)					4d 11/28						
	Cumulative number emerged		3			4			5		6	
	# Pairings					w/609 D 11/23						
	# Egg Case						10 ~1635					
	# Eggs / Time to hatch / # hatched						207 unh. 12/1 110 unh. 12/2					
	Init./Date (1999)	11/20	11/21 JM	11/22 JM	11/23	11/24 JM	11/25 JM	11/26 [illegible]	11/27 [illegible]	11/28 JM	11/29 JS	11/30

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

(1) ~~Missing~~ Test Day Correction JT 11/30/99

Review: [illegible] Date: 12/2/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000075

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12609 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12609 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/20	11/21 JM	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30

(1)

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments: (1) Test Day correction J 11/30/99

Review: J Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000076

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	~~53~~ 55
12609 A	# Males emerged											0
	Male Time to Mortality (days)											0L
	# Females emerged											0P
	Females Time to Mortality (days)											12/13 SG
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12609 B	# Males emerged											
	Male Time to Mortality (days)											0L
	# Females emerged											0P
	Females Time to Mortality (days)											12/13 SG
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12609 C	# Males emerged											
	Male Time to Mortality (days)											0L
	# Females emerged											0P
	Females Time to Mortality (days)											12/13 SG
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	~~12/11~~

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Review: [illegible] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

000077

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	~~53~~ Day 55
12609 D	# Males emerged		1									
	Male Time to Mortality (days)		4d 12/6									0L
	# Females emerged	1										0P
	Females Time to Mortality (days)	6d 12/7										12/13 JG
	Cumulative number emerged											
	# Pairings	w/6090 11/30										
	# Egg Case		1° 1102 13unh.	12/8								
	# Eggs / Time to hatch / # hatched		10 unh	12/9								
12609 E	# Males emerged											
	Male Time to Mortality (days)											0L
	# Females emerged											0P
	Females Time to Mortality (days)											12/13 JG
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12609 F	# Males emerged											
	Male Time to Mortality (days)											0L
	# Females emerged		1		1		1					0P
	Females Time to Mortality (days)		4d 12/6		5d 12/9		3d 12/9					12/13 JG
	Cumulative number emerged		7		8		9					
	# Pairings		w/609D 12/2		w/609P ♂12/2		w/609M ♂12/5	609F ♂ w/609M 12/5				
	# Egg Case			1° 1152				1° 1392				
	# Eggs / Time to hatch / # hatched			30unh / 1unh. 12/10	12/9			3 unhatched 12/13				
	Init./Date (1999)	12/1 TM	12/2 TM	12/3 JG	12/4 JG	12/5	12/6 JG	12/7 TM	12/8	~~12/9~~ TM	12/10	~~12/11~~

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Review: ______ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays~~32-42~~ 43-53

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3615 / 3622	Test Start: 10/19/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	~~53~~ 53
12609 G	# Males emerged											0
	Male Time to Mortality (days)											0L
	# Females emerged											0P
	Females Time to Mortality (days)											12/13 JG
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12609 H	# Males emerged											
	Male Time to Mortality (days)											0L
	# Females emerged											0P
	Females Time to Mortality (days)											12/13 JG
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/1	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	~~12/11~~

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Comments:

Review: [signature] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays ~~32-42~~ 43-53

000079σ

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/16			No. of Egg Cases ~~7~~ 8 JG		
Date (1999)	# Days Post-Deposit	Temperature (°C)	Feeding (*Selenastrum*)	Observations	Test Use
10/16	0	19.2°C	✓		
10/17	1	19.3°C	✓		
10/18	2	22 C	—	→ cooler temp	
10/19	3				10/19 C.t. chronic
10/20	4	16.7	✓		10/20 C.t. chronic
	5				

SOURCE: Aquatec cultures

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/15			No. of Egg Cases 7		
Date (1999)	# Days Post-Deposit	Temperature (°C)	Feeding (*Selenastrum*)	Observations	Test Use
10/15/99	0	19.0°C	✓	7 cases	
10/16	1		✓		
10/17	2	20.3	✓ ~~Feeding~~ JG		
10/18	3	22.5	—	hatching in egg cases → combined.	
10/19	4				Chronic C.T. 10/19 START
10/20	5				Chronic C.T. 10/20 START

Source: Aquatec cultures

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/26/99			No. of Egg Cases 4		
Date (1999)	# Days Post-Deposit	Temperature (°C)	Feeding (*Selenastrum*)	Observations	Test Use
10/26	0				
10/27	1				
10/28	2		✓		
10/29	3	23.5	—	Hatching	Aux male beakers
	4				
	5				
Source of egg cases: Aquaree					

Samples 12548, 12550, 12551, 12552, 12592, 12593, 12609
Auxil. Male beakers (reps M, N, O, P)

J

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3519/3622 (3615) Test Start 10/19/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis 0										
12548	T (°C)	23.4	21.6	22.9	22.7/22.2	22.7/22.9	21.9/22.4	22.1/22.6	23.1/22.9	22.4/22.7	22.8/22.7	22.5/22.5
	pH	7.7	—	—	7.6	—	—	7.5		7.6		7.4
	DO (mg/L)	6.2	6.1	5.1	6.2	—	—	5.5		6.1	4.9	4.2
	Conductivity	400	X	X	X	X	X	X	315	X	X	X
12550	T (°C)	22.3	21.5	22.8	22.2/22.2			21.4/21.7	21.9/22.2	22.3/22.0	22.0/21.9	22.5/22.7
	pH	7.9	—	—	7.7	—	—	7.6		7.6		7.5
	DO (mg/L)	7.3	6.7	5.7	6.2	—	—	5.4		5.2	4.8	4.6
	Conductivity	380	X	X	X	X	X	X	335	X	X	X
12551	T (°C)	22.4	22.4	22.6	22.7/22.2							22.4/22.7
	pH	7.9	—	—	7.7	—	—	7.6		7.6		7.6
	DO (mg/L)	6.4	6.8	6.3	6.2	—	—	5.5		4.4	4.2	5.0
	Conductivity	380	X	X	X	X	X	X	340	X	X	X
12552	T (°C)	22.0	22.4	22.7								22.9/22.9
	pH	7.6	—	—	7.6	—	—	7.6		7.4		7.6
	DO (mg/L)	8.7	7.8	6.5	7.2	—	—	6.1		4.1	4.5	5.8
	Conductivity	420	X	X	X	X	X	X	350	X	X	X
	Init./Date (1999):	10/19	10/20 JM	10/21 SG	10/22 JM	10/23 SG	10/24 SG	10/25 JM	10/26 JM	10/27 TM	10/28 JM	10/29

10/29 Day 10 Aux Male Vials Sieved.

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure conductivity weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

D.O. / pH - three times weekly (minimum)

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Day 9 - Set up Aux Male Beakers Done 10/28 Food to replic.

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3519~~ 3615/3622 Test Start 10/19/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12592	T (ºC)	22.3	21.9	22.7		—	—					22.7/22.7
	pH	7.9	—	—	7.8	—	—	7.7		7.3		7.7
	DO (mg/L)	7.9	7.2	6.3	6.6	—	—	6.0		3.3	4.7	5.1
	Conductivity	370	X	X	X	X	X	X	340	X	X	X
12593	T (ºC)	22.6	22.4	22.8								22.9/22.7
	pH	7.8	—	—	7.7	—	—	7.6		7.5		7.6
	DO (mg/L)	7.1	6.8	5.9	6.1	—	—	5.2		5.0	5.2	4.9
	Conductivity	375	X	X	X	X	X	X	340	X	X	X
12609	T (ºC)	21.7	22.5	22.7								21.8/22.2
	pH	7.7	—	—	7.5	—	—	7.5		7.6		7.4
	DO (mg/L)	6.6	5.9	5.5	5.2	—	-	5.5		5.3	5.6	4.1
	Conductivity	385	X	X	X	X	X	X	350	X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	Init./Date (1999):	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure conductivity weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

D.O./pH three times weekly (minimum).

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont.

000034

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3519/3622~~ 3615-3622 Test Start 10/19/99

Sample	Parameter	11	12	13	14	15	16	17	18	19	20	21
		Day of Analysis										
12548	T (ºC)	22.9/22.9	23.0/23.1	22.8/22.9	22.6/22.9	22.9/22.6	22.8/22.0	22.5/22.4	22.5/22.7	23.4/22.7	22.9/22.8	22.2/22.5
	pH	—	—	7.5		7.5		7.5			7.6	
	DO (mg/L)	—	—	6.0		5.0		4.8			6.4	
	Conductivity A+H	X	X	X	320	X	X	X	X	X	320	X
12550	T (ºC)	22.8/22.9			22.5/22.4							
	pH	—	—	7.5		7.4		7.4			7.6	
	DO (mg/L)	—	—	5.4		4.8		4.8			5.5	
	Conductivity A+H	X	X	X	310	X	X	X	X	X	330	X
12551	T (ºC)	22.8/22.8										
	pH	—	—	7.5		7.5		7.5			7.7	
	DO (mg/L)	—	—	5.7		5.3		5.1			6.9	
	Conductivity A+H	X	X	X	320	X	X	X	X	X	320	X
12552	T (ºC)	23.3/23.3										
	pH	—	—	7.6		7.6		7.6			7.7	
	DO (mg/L)	—	—	6.4		6.1		6.4			7.0	
	Conductivity	X	X	X	340	X	X	X	X	X	330	X
	Init./Date (1999): A+H	10/30	10/31 JG	11/1 JG	11/2 TM	11/3 JG	11/4	11/5	11/6	11/7 TM	11/8 JG	11/9 TM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3519~~ 3615/3622 Test Start 10/19/99

Sample	Parameter	11	12	13	14	15	16	17	18	19	20	21
		Day of Analysis										
12592	T (°C)	23.1/22.9										
	pH	—	—	7.7		7.7		7.6			7.7	
	DO (mg/L)	—	—	6.0		5.3		5.5			6.3	
	Conductivity	X	X	X	335	X	X	X	X	X	360	X
12593	T (°C)	23.1/23.1										
	pH	—	—	7.6		7.6		7.7			7.8	
	DO (mg/L)	—	—	5.4		4.9		5.6			6.4	
	Conductivity	X	X	X	335	X	X	X	X	X	340	X
12609	T (°C)	22.0/22.5										
	pH	—	—	7.4		7.3		7.5			7.6	
	DO (mg/L)	—	—	4.6		4.4		5.2			6.1	
	Conductivity	X	X	X	340	X	X	X	X	X	340	X
	T (°C)											
	pH	—	—									
	DO (mg/L)	—	—									
	Conductivity	X	X	X		X	X	X	X	X		X
	Init./Date (1999):	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 / 22 Test Start 10/19/99

Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
		Day of Analysis										
12548	T (ºC)	22.8/22.6	22.0/22.2	22.0/22.7	22.2/22.4	22.4/22.1	22.3/22.2	22.6/22	22.3/22.4	22.5/22.6	22.4/22.0	22.6/22.4
	pH	7.5		7.7			7.5	7.5			7.6	
	DO (mg/L)	4.1		6.4			6.1	5.4			5.4	
	Conductivity	X	X	X	X	X	X	340	X	X	X	X
12550	T (ºC)											
	pH	7.5		7.6			7.5	7.5			7.5	
	DO (mg/L)	4.2		6.4			5.6	6.4			5.5	
	Conductivity	X	X	X	X	X	X	360	X	X	X	X
12551	T (ºC)											
	pH	7.5		7.6			7.5	7.5			7.5	
	DO (mg/L)	5.0		6.1			6.2	6.5			6.3	
	Conductivity	X	X	X	X	X	X	350	X	X	X	X
12552	T (ºC)											
	pH	7.5		7.6			7.6	7.6			7.6	
	DO (mg/L)	4.6		6.5			6.8	7.4			6.6	
	Conductivity	X	X	X	X	X	X	330	X	X	X	X
	Init./Date (1999):	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, ~~then weekly~~.

end of test

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 / 22 Test Start 10/19/99

Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
		Day of Analysis										
12592	T (°C)											
	pH	7.6		7.7			7.6	7.6			7.5	
	DO (mg/L)	3.7		6.3			6.3	5.9			6.3	
	Conductivity	X	X	X	X	X	X	360	X	X	X	X
12593	T (°C)											
	pH	7.6		7.7			7.7	7.7			7.6	
	DO (mg/L)	3.8		6.0			5.6	6.3			6.3	
	Conductivity	X	X	X	X	X	X	360	X	X	X	X
12609	T (°C)											
	pH	7.5		7.6			7.6	7.5			7.6	
	DO (mg/L)	4.6		6.3			5.5	5.9			6.2	
	Conductivity	X	X	X	X	X	X	360	X	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	Init./Date (1999):	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, ~~then weekly~~. end of test

Review: ____ Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 / 22 Test Start 10/19/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	43
		Day of Analysis										
12548	T (°C)	22.4/22.6	22.5/22.4	22.7/22.9	21.4/21.3	22.1/22.3	22.2/22.7	22.5/22.4	22.6/22.0	22.7/22.4	22.7/22.6	22.6/22.2
	pH		7.6		7.6		7.5			7.6	7.3	7.4
	DO (mg/L)		5.2	6.8	6.4 ~~5.7~~		7.1			6.5	4.1	3.7
	Conductivity A+H/Amm.	X	X	340	X	X	X	X	X	X	320	X
12550	T (°C)										—	—
	pH		7.5		7.6		7.3			7.5	—	—
	DO (mg/L)		4.4	5.2	4.8		5.8			5.7	—	—
	Conductivity A+H/Amm	X	X	340	X	X	X	X	X	330	—	X
12551	T (°C)										—	—
	pH		7.6		7.6		7.4			7.5	—	—
	DO (mg/L)		5.3	4.6	4.7		6.1			6.0	—	—
	Conductivity A+H/Amm	X	X	350	X	X	X	X	X	345	—	X
12552	T (°C)											
	pH		7.6		7.6		7.4			7.5	7.4	7.4
	DO (mg/L)		6.7	6.7	6.0		6.7			6.7	5.4	5.1
	Conductivity A+H/Amm.	X	X	330	X	X	X	X	X	X	330	X
	Init./Date (1999):	11/21 JM	11/22 JG	11/23 JG	11/24	11/25 JM	11/26	11/27 JG	11/28 JM	11/29 JG	11/30 TM	12/1 TM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, ~~then weekly~~. end of test

Review: ____ Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 / 22 Test Start 10/19/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	43
		Day of Analysis										
12592	T (°C)											
	pH		7.7		7.7	~~7.4~~	7.4			7.5	7.5	7.4
	DO (mg/L)		6.3	6.7	~~6.7~~ 6.0		6.9			6.4	5.1	4.5
	Conductivity A+H/Amm.	X	X	340/✓	X	X	X	X	X	X	350 ✓	X
12593	T (°C)											
	pH		7.7		7.7		7.4			7.6	7.5	7.4
	DO (mg/L)		6.0	6.1	5.9		6.2			6.5	4.9	4.2
	Conductivity A+H/Amm.	X	X	350/✓	X	X	X	X	X	X	350 ✓	X
12609	T (°C)											
	pH		7.5		7.6		7.4			7.4	7.3	7.3
	DO (mg/L)		5.0	5.1	~~5.4~~		7.0			6.1	4.4	3.8
	Conductivity A+H/Amm	X	X	330/✓	X	X	X	X	X	X	335 ✓	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	Init./Date (1999):	11/21 JM	11/22 JB	11/23	11/24	11/25 JM	11/26	11/27	11/28 JM	11/29	11/30 TM	12/1 TM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, ~~then weekly~~.

end stress

Review: ____ Date: 12/21/99
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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 / 22 Test Start 10/19/99

Sample	Parameter	44	45	46	47	48	49	50	51	52	53	54
		Day of Analysis										
12548	T (°C)	22.2 / 22.9	22.4 / 22.7	22.7 / 22.7	22.4 / 22.4	22.5 / 22.7	22.6 / 23.1	22.2 / 21.9	22.6 / 22.7			
	pH		7.4			7.4		7.4	7.4			
	DO (mg/L)		3.9			3.7		2.4 (*)	3.6			
	Conductivity AtH/Amm	X	X		X	X	X	X	358	X		X
12550	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
12551	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
12552	T (°C)											
	pH		7.3									
	DO (mg/L)		4.4									
	Conductivity	X	X 330		X	X	X	X	X	X		X
	Init./Date (1999):	12/2 JM	12/3 G	12/4 G	12/5 JM	12/6 JM	12/7 JM	12/8 JM	12/9 JM	12/10	12/11	12/12

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness at end of test for any samples.

(*) Did an extra manual renewal 09:30 12/8 JM 13:30 JM 12/8

Review: J Date: 12/21/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3615 / 22 Test Start 10/19/99

		Day of Analysis											
Sample	**Parameter**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	
12592	T (ºC)												
	pH		7.3			7.4							
	DO (mg/L)		4.9			3.9							
	Conductivity Amm./A+H	X	X		X	350 ~~X~~	X	X	X	X		X	
12593	T (ºC)												
	pH		7.3			7.4	7.5						
	DO (mg/L)		4.6			4.2	4.5						
	Conductivity Amm./A+H	X	X		X	X	358 ~~X~~	X	X	X		X	
12609	T (ºC)									22.7	22.7	22.5	21.7
	pH		7.3			7.4		7.4		7.3			7.3
	DO (mg/L)		3.9			3.7		3.9		4.6			3.4
	Conductivity	X	X		X	X	X	X	X	X	360	*	360 A+H/AMMO.
	T (ºC)												
	pH												
	DO (mg/L)												
	Conductivity	X	X		X	X	X	X	X	X		X	
	Init./Date (1999):	12/2 TM	12/3 JC	12/4	12/5 TM	12/6 TM	12/7 TM	12/8 TM	12/9 TM	12/10 JC	12/11 JC	12/12 TM	12/13 JC

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness at end of test for any samples.

Review: Date: 12/21/99
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Midge (*Chironomus tentans*) Chronic Toxicity Test
Day 20 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: ~~3529~~ 3629
	Test Start: October 20, 1999	Day 20: November 9, 1999

Sample	Repl.	Initial # Larvae	# Alive	11/8/99 Init.	Larvae preserved? Y / N	Crucible #	# Weighed	Ashed Pan Wt.	Ashed Pan Wt. + Larval Dry Wt.	Ashed Pan and Ashed Larval Wt.
12611	I	12	OP OL	TM	Y					
	J	12	OP OL	TM	Y					
	K	12	OP OL	TM	Y					
	L	12	OP OL	TM	Y					
12612	I	12	OP OL	TM	Y					
	J	12	OP OL	TM	Y					
	K	12	OP OL	TM	Y					
	L	12	OP OL	TM	Y					
12613	I	12	OP OL	TM	Y					
	J	12	OP OL	TM	Y					
	K	12	OP OL	TM	Y					
	L	12	OP OL	TM	Y					
12614	I	12	OP OL	TM	Y					
	J	12	OP OL	TM	Y					
	K	12	OP 3L	TM	Y	1	3	2,233.97	2251.81	2,240.30
	L	12	OP OL	TM	Y					
12622	I	12	1P 6L	TM	Y	2	6	2,122.27	2,139.80	2,123.57
	J	12	1P 3L	TM	Y	3	3	2,385.94	2,396.04	2,387.54
	K	12	2P 5L	TM	Y	4	5	2,286.58	2,303.40	2,289.39
	L	12	2P 2L	TM	Y	5	2	2,313.25	2,322.18	2,315.19

Date / Time / Init. Larvae in oven: 11/26 16:45 Date / Time / Init. Larvae out of oven: 11/27 15:00 JG

Date / Time / Init. Larvae in furnace: 11/27 15:15 Date / Time / Init. Larvae out of furnace:

Balance QC: Initial (20 mg = 2000.07) Final (20 mg = 2000.06) Balance Asset #:

Date/time In 11/26 16:45 Temp(°C) 80 Init. JG Date/time out 11/27 15:00 Temp(°C) 80°C Init. JG

Comments:

Reviewer: JG Date: 12/21/99

ctday20doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12611 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays21-31

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12611 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12611 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: ______ Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000096

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12611 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21 JM	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1.)
12611 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21 [illegible]	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

(1) Test Day Correction [illegible] 11/30/99

Review: [illegible] Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12611 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									1		
	Females Time to Mortality (days)									5d 12/4		
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21 JM	11/22	11/23	11/24	11/25	11/26	11/27	11/28	~~11/28~~ 11/29 JG	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

① Test Day Correction J 11/30/99

Review: J Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12611 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0L						
	Females Time to Mortality (days)					0P						
	Cumulative number emerged					12/6 JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0L						
	Females Time to Mortality (days)					0P						
	Cumulative number emerged					12/6 JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0L						
	Females Time to Mortality (days)					0P						
	Cumulative number emerged					12/6 JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Review: ___________ Date.

ctdays43-53

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000100

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12611 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0L						
	Females Time to Mortality (days)					0P						
	Cumulative number emerged					12/6JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0L						
	Females Time to Mortality (days)					0P						
	Cumulative number emerged					12/6JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0L						
	Females Time to Mortality (days)					0P						
	Cumulative number emerged					12/6JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Review: J Date: 12/21/99

ctdays43-53

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12611 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0 L						
	Females Time to Mortality (days)					0 P						
	Cumulative number emerged					12/6 JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12611 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					0 L						
	Females Time to Mortality (days)					0 P						
	Cumulative number emerged					12/6 JG						
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/2	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Comments:

Review: JJ 12/21/99 Date: 12/21/99

ctdays43-53

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12612 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12612 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [signature] Date: 12/21/99 ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12612 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 H	# Males emerged				1		1					1
	Male Time to Mortality (days)				5d 11/18		6d 11/21					6d 11/26
	# Females emerged								2 dead			
	Females Time to Mortality (days)								0d 11/17 / 0d 11/17			
	Cumulative number emerged				1		2		4			5
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13 JG	11/14	11/15 JG	11/16	11/17 JG	11/18 JM	11/19	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: ______ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays21-31

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12612 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)									OL		
	Cumulative number emerged									OP		
	# Pairings									11/29 TM		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									OL		
	Females Time to Mortality (days)									OP		
	Cumulative number emerged									11/29 TM		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									OL		
	Females Time to Mortality (days)									OP		
	Cumulative number emerged									11/29 TM		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Review: ________ Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1)
12612 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29 TG		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29 TM		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29 TM		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

(1) Test Day Correction TG 11/30/99

Review: TG Date: 12/21/99 ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000107

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

(1)

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12612 G	# Males emerged										-	
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29 JG		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12612 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29		
	# Pairings									TM		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Comments:

(1) Test Date Correction J 11/30/99 JG

Review: J Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000108

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12613 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 B	# Males emerged							1				
	Male Time to Mortality (days)							3d 11/14				
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 C	# Males emerged	1	0 ~~1~~ jm			1	1 1					
	Male Time to Mortality (days)	1d 11/11	0 ~~1~~ jm			4d 11/18	4d 11/19 4d 11/19					
	# Females emerged					1		1				1
	Females Time to Mortality (days)					4d 11/18		3d 11/19				1d 11/21
	Cumulative number emerged	1				3	5	6				7
	# Pairings					1		paired w/ 6138 11/16				
	# Egg Case						1° 1897		1°			
	# Eggs / Time to hatch / # hatched						43 unhatched 11/22		1694 ~500 unhatched	1423 ≈500 unhatched 11/24		
	Init./Date (1999)	11/10 JM	11/11 JM	11/12	11/13	11/14 JG	11/15 JG	11/16 JM	11/17 JM	11/18 JM	11/19 JM	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

① correction 11/10 jm

Review: J Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12613 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12613 G	# Males emerged				-							
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000111

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12613 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									OL		
	Females Time to Mortality (days)									OP		
	Cumulative number emerged									11/29 TM		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									OL		
	Females Time to Mortality (days)									OP		
	Cumulative number emerged									11/29 JG		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									OL		
	Females Time to Mortality (days)									OP		
	Cumulative number emerged									11/24 JG		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Review: ____ Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 32	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12613 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29 JM		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29 JG		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									0L		
	Females Time to Mortality (days)									0P		
	Cumulative number emerged									11/29 JG		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

(1) Test Date (Day) Correction JW 11/20/99

Review: J Date 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000113

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1.)
12613 G	# Males emerged											-
	Male Time to Mortality (days)											
	# Females emerged									OL		
	Females Time to Mortality (days)									OP		
	Cumulative number emerged									11/29		
	# Pairings									JG		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12613 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged									OL		
	Females Time to Mortality (days)									OP		
	Cumulative number emerged									11/29 JG		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

Comments:

(1.) Test Day Correction 11/30/99 JG

Review: J Date: 12/29/99 ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12614 A	# Males emerged	1				1 1			1 dead			
	Male Time to Mortality (days)	7d 11/17				3d 11/17 6d 11/2[illegible]			0d 11/17			
	# Females emerged					1				1	1	
	Females Time to Mortality (days)					3d 11/17				2d 11/20	4d 11/23	
	Cumulative number emerged	1				~~3~~ 4 JG ①			5	6	7	
	# Pairings					1				w/614A ♂ 11/14	w/614G ♂ 11/17	
	# Egg Case											1 0
	# Eggs / Time to hatch / # hatched											612 3 unhatched 100% 11/26 0 unhatched 11/27
12614 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12614 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10 MM	11/11	11/12	11/13	11/14 JG	11/15	11/16	11/17 JG	11/18 MM	11/19 JG	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

① correction. JG 11/14 Also 1 dead pupae found near top of 12614 A JG

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12614 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12614 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12614 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays21-31

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12614 G	# Males emerged								1			
	Male Time to Mortality (days)								6d 11/23			
	# Females emerged							1 escaped		1		1
	Females Time to Mortality (days)									2d 11/20		4d 11/24
	Cumulative number emerged								2			3
	# Pairings									w/ 6149 ♂ G 11/17		w/ 6146 ♂ 11/17
	# Egg Case											≥10 11/21
	# Eggs / Time to hatch / # hatched											
12614 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16 JM	11/17 JG	11/18 JM	11/19 JM	11/20 JG

11/21 JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000117

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12614 A	# Males emerged			1 1								
	Male Time to Mortality (days)			1d 11/24 \ 5d 11/28								
	# Females emerged											
	Females Time to Mortality (days)										OL	
	Cumulative number emerged			9							OP	
	# Pairings										11/30 TM	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12614 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/30 TM	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12614 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/30 TM	
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ________ Date: 12/2/99 ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1.)
12614 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)										OL	
	Cumulative number emerged										OP	
	# Pairings										11/30 TJM	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12614 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/30	
	# Pairings										TJM	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12614 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										OL	
	Females Time to Mortality (days)										OP	
	Cumulative number emerged										11/30	
	# Pairings										TJM	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

(1.) Test Day Correction TJ 11/30/99

Review: TJ Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12614 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged										0L	
	Females Time to Mortality (days)										0P	
11/20 ♀ w/ 12614 G ♂ 11/17	Cumulative number emerged										TJM	
from 11/20	# Pairings	~~11/20~~									11/30	
	# Egg Case	1										
	# Eggs / Time to hatch / # hatched	2,336 ~490 unh. 11/27										
12614 H	# Males emerged	~400 unh. 11/28										
	Male Time to Mortality (days)											
	# Females emerged										0L	
	Females Time to Mortality (days)										0P	
	Cumulative number emerged										11/30	
	# Pairings										TJM	
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21 JJM	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments: (1.) Test day correction J 11/30/99

Review: J Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12622 A	# Males emerged			1 1 escaped	1		1			1	1	1
	Male Time to Mortality (days)			6d 11/18	5d 11/18		6d 11/21			7d 11/25	9d 11/25	5d 11/25
	# Females emerged				1	1, 1			1			
	Females Time to Mortality (days)				2d 11/5	3d 11/17 6d 11/20			5d 11/22			
	Cumulative number emerged				←	4 6	7				10	11
	# Pairings				w/622A ♂	w/622F ♂ 11/13 w/622B ♂ 11/11		w/622C ♂ 11/11	w/622H ♂ 11/16		w/622A ♂ 11/19	
	# Egg Case						622A♂ 1 0 JG ~~1,252~~					
	# Eggs / Time to hatch / # hatched						285 28 unhatched 11/22					
12622 B	# Males emerged		1									
	Male Time to Mortality (days)		5d 11/16									
	# Females emerged			1		1						1
	Females Time to Mortality (days)			6d 11/18		3d 11/17						1d 11/21
	Cumulative number emerged		1	2		3						4
	# Pairings			~~w/622A ♂~~	w/622C ♂ 11/13	w/622F ♂ 11/14						w/622A ♂
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 C	# Males emerged	1	1		1							
	Male Time to Mortality (days)	3d 11/13	7d 11/18		6d 11/19							
	# Females emerged					1						
	Females Time to Mortality (days)					4d 11/18						
	Cumulative number emerged	1	2		3	4						
	# Pairings					1 w/622 B♂ 11/13						
	# Egg Case						1 0 11/14 1361					
	# Eggs / Time to hatch / # hatched						6 unhatched 11/22					
	Init./Date (1999)	11/10 JM	11/11 JM	11/12 JG	11/13 JG	11/14 JG	11/15 JM	11/16	11/17 JM	11/18 JM	11/19 JM	11/20 JG

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: [signature] Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12622 D	# Males emerged		1									
	Male Time to Mortality (days)		2d 11/13									
	# Females emerged							1				
	Females Time to Mortality (days)							3d 11/19				
	Cumulative number emerged		1					2				
	# Pairings							w/622 F 11/16				
	# Egg Case								1° 883			
	# Eggs / Time to hatch / # hatched								~100 unhatched 11/23	25 unhatched 11/24		
12622 E	# Males emerged				1						1	
	Male Time to Mortality (days)				4d 11/17						5d 11/24	
	# Females emerged				1						1	
	Females Time to Mortality (days)				not recorded						2d 11/21	
	Cumulative number emerged				2						3	
	# Pairings				1						1	
	# Egg Case						1° 1,252					1° 11/21
	# Eggs / Time to hatch / # hatched						8 unhatched 11/22					
12622 F	# Males emerged	1	1D		1	1		1				
	Male Time to Mortality (days)	3d 11/17	0d 11/11	~~6~~ JM	8d 11/21	3d 11/17		4d 11/20				
	# Females emerged			1					1	1		
	Females Time to Mortality (days)			6d 11/18					not recorded	3d 11/20		
	Cumulative number emerged	1	2		4				~~5~~ 7 JG	8		
	# Pairings			w/ 662A ♂					w/622G ♂ 11/17	w/622 A		
	# Egg Case					1° EST. 725				1° 851		
	# Eggs / Time to hatch / # hatched					8 unhatched 100% 11/21				67 unhatched 11/24 67 unhatched 11/25		
	Init./Date (1999)	11/10 JM	11/11 JM	11/12 JG	11/13 JG	11/14 JG	11/15 JG	11/16 JM	11/17 JM	11/18 JM	11/19 JM	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12622 G	# Males emerged				1			1	1			
	Male Time to Mortality (days)				5d 11/18			9d 11/25	4d 11/21			
	# Females emerged					1	1 1					
	Females Time to Mortality (days)					4d 11/18	3d 11/18 | 11/21					
	Cumulative number emerged				1	2	~~4/22A~~ 4 ~~4~~	5	6			
	# Pairings					w/622E♂ 11/13	w/122A ♂ | w/622A ♂ 11/18		w/622G♂ 11/16			
	# Egg Case					-		1°	1° ~549 → 11/18		1°	
	# Eggs / Time to hatch / # hatched							1,508 53 unhatched 11/22	~~46 unhatched~~ 41 unhatched		390 ~25 unhatched 11/26 45 unhatched 11/25 11/24 11/25	
12622 H	# Males emerged							1				
	Male Time to Mortality (days)							7d 11/23				
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged							1				
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: ________ Date: 12/21/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12622 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1.)
12622 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged					1						
	Females Time to Mortality (days)					3d 11/28						
	Cumulative number emerged											
	# Pairings					w/ 622 P ♂						
From 11/19 pair	# Egg Case	1										
	# Eggs / Time to hatch / # hatched	810 ~135 unh. 11/27 26 unhatched 11/27										
12622 F	# Males emerged			1								
	Male Time to Mortality (days)			4d 11/27								
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged			9								
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21 JM	11/22	11/23 JG	11/24	11/25 JM	11/26	11/27	11/28 TM	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/21/99 (1.) Test Day Correction J 11/30/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1)
12622 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

(1) Test Day correction 11/20/99

Review: ______ Date: 12/21/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12622 A	# Males emerged											
	Male Time to Mortality (days)	0L										
	# Females emerged	0P										
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 B	# Males emerged											
	Male Time to Mortality (days)	0L										
	# Females emerged	0P										
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 C	# Males emerged											
	Male Time to Mortality (days)	0L										
	# Females emerged	0P										
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/2 GA	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/21/99 ctdays43-53

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3629	Test Start: 10/20/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12622 G	# Males emerged											
	Male Time to Mortality (days)	0L										
	# Females emerged	1P										
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12622 H	# Males emerged											
	Male Time to Mortality (days)	0L										
	# Females emerged	0P										
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/2 [illegible]	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [illegible] Date: 12/21/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays43-53

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/16			No. of Egg Cases ~~7~~ 8 JG		
Date (1999)	**# Days Post-Deposit**	**Temperature (°C)**	**Feeding (*Selenastrum*)**	**Observations**	**Test Use**
10/16	0	19.2°C	✓		
10/17	1	19.3°C	✓		
10/18	2	22C	–	– cooler temp	
10/19	3				10/19 C.t. chronic
10/20	4	16.7	✓		10/20 C.t. chronic
	5				

SOURCE: Aquatec Cultures

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/15			No. of Egg Cases 7		
Date (1999)	**# Days Post-Deposit**	**Temperature (°C)**	**Feeding (*Selenastrum*)**	**Observations**	**Test Use**
10/15/99	0	19.0°C	✓	7 cases	
10/16	1		✓		
10/17	2	20.3	✓ ~~Feeding~~ JG		
10/18	3	22.5	—	hatching in egg cases → cooled.	
10/19	4				Chronic C.T. 10/19 START
10/20	5				Chronic C.T. 10/20 START

Source: Aquatec cultures

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/~~26~~27			No. of Egg Cases 4		
Date (1999)	# Days Post-Deposit	Temperature (°C)	Feeding (*Selenastrum*)	Observations	Test Use
10/27	0				
10/28	1				
10/29	2	23.5	✓		
10/30	3	23.2	✓	HATCHING	AUX MALE BEAKERS
	4				
	5				
Source of egg cases:		Aquatec cultures			

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 35629 Test Start 10/20/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10	11
		Day of Analysis											
12611	T (ºC)	23.3		22.2/21.9	~~22.9~~/22.1	22.4/22.0	21.8/21.2	22.1/22.0	22.9/22.9	23.1/22.8	22.1/22.1	22.6/22.6	22.9/22.8 10/31 JG
	pH	7.6	7.5→		—	—	7.5		7.5		7.6	—	
	DO (mg/L)	5.8	6.8→		—	—	5.7		5.8		5.1	—	
	Conductivity/ A+N Ammonia	360/✓	X	X	X	X	X	X	330	X	X	X	
12612	T (ºC)	22.5		21.8			22.9/23.0	22.7/22.4	22.5/22.1	22.0/21.9	22.1/21.8	22.5/22.5	
	pH	7.8	7.8→		—	—	7.7		7.7		7.8	—	
	DO (mg/L)	6.1	7.0→		—	—	6.0		5.8		5.7	—	
	Conductivity/ A+N Amm	370/✓	X	X	X	X	X	X	340	X	X	X	
12613	T (ºC)	23.6									22.2/21.8	22.4/22.4	
	pH	7.9	7.8→		—	—	7.7		7.6		7.6	—	
	DO (mg/L)	6.2	7.1→		—	—	5.8		5.4		4.9	—	
	Conductivity/ A+N Amm	370/✓	X	X	X	X	X	X	330	X	X	X	
12614	T (ºC)	23.5									22.2/22.2	22.6/22.5	
	pH	7.7	7.8→		—	—	7.6		7.6		7.6	—	
	DO (mg/L)	5.7	7.1→		—	—	5.0		5.3		5.3	—	
	Conductivity/ A+N Amm	370/✓	X	X	X	X	X	X	365	X	X	X	
	Init./Date (1999):	10/20	10/21	10/22	10/23 JG	10/24 JG	10/25	10/26	10/27	10/28	10/29	10/30	

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

↑ Day 9 - Set up Aux Male Beakers

10/30 Day 10 Aux male Rep sacrificed.

Review: ______ Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates | Project: 99033 Dead Creek | BTR: 35629 Test Start 10/20/99

Sample	Parameter	Day of Analysis 0	1	2	3	4	5	6	7	8	9	10
12622	T (ºC)	23.4									~~22.7~~ 22.5	~~22.9~~ 22.9
	pH	7.0	7.3 →		—	—	7.6		7.6		7.6	—
	DO (mg/L)	7.8	6.9 →		—	—	6.1		6.0		5.5	—
	Conductivity	~~370~~	X	X	X	X	X	X	355	X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	Init./Date (1999):	10/20	10/21	10/22 JM	10/23 JG	10/24 JG	10/25 JM	10/26 JM	10/27 JM	10/28 JM	10/29 JB	10/30 JB

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

Review: J Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3~~5~~629 Test Start 10/20/99

Sample	Parameter	Day of Analysis 11	12	13	14	15	16	17	18	19	20	21
12611	T (°C)	22.9/~~22.8~~	22.7/22.7	22.6/22.5	22.8/22.6	22.3/22.4	22.7/22.7	22.3/22.5	22.3/22.2	22.7/22.5	22.5/22.5	22.5/23.1
	pH		7.6		7.6		7.5			7.7	7.5	7.5
	DO (mg/L)		5.8		5.9		5.0			6.5	4.6	3.6
	Conductivity A+H	X	X	X	360 ✓	X	X	X	X	X	360 ✓	X
12612	T (°C)			22.8/22.9					22.8/22.7		22.7/23.0	
	pH		7.8		7.6		7.6			7.7	7.6	7.6
	DO (mg/L)		6.3		5.2	6.4	~~5.0~~			6.5	5.1	4.8
	Conductivity A+H	X	X	X	350 ✓	X	X	X	X	X	380 ✓	X
12613	T (°C)											
	pH		7.8		7.8		7.7			7.7	7.8	7.6
	DO (mg/L)		6.6		6.8	5.5	~~4.9~~			6.0	5.7	4.4
	Conductivity A+H	X	X	X	330 ✓	X	X	X	X	X	400 ✓	X
12614	T (°C)											
	pH		7.6		7.7		7.6			7.7	7.6	7.6
	DO (mg/L)		6.2		6.2		6.7			6.3	5.2	5.6
	Conductivity A+H	X	X	X	360 ✓	X	X	X	X	X	380 ✓	X
	Init./Date (1999):	10/31 JG	11/1 JG	11/2 JM	11/3 JG	11/4	11/5	11/6	11/7 JM	11/8 JG	11/9 JM	11/10 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

Review: ______ Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3529~~ 3629 Test Start 10/20/99

Sample	Parameter	11	12	13	14	15	16	17	18	19	20	21
		Day of Analysis										
12622	T (ºC)											
	pH		7.8		7.7		7.5				7.6	7.5
	DO (mg/L)		6.6		6.5		5.3				6.5	5.3
	Conductivity A+H	X	X	X	379 ✓	X	X	X	X	X	380 ✓	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	Init./Date (1999):	10/31 JG	11/1 JG	11/2 JM	11/3 JG	11/4 CL	11/5 JJ	11/6	11/7 JM	11/8	11/9 TM	11/10 TM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

Review: J Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

~~M~~idge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 Test Start 10/20/99

Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
		Day of Analysis										
12611	T (°C)	23.5/22.7	22.4/22.5	22.3/22.7	22.6/23.1	22.3/22.5	22.9/23.1	22.5/22.7	22.6/23.3	22.3/22.7	22.5/22.8	22.8/22.9
	pH		7.3			7.4		7.4		7.4		
	DO (mg/L)		6.4			5.2		5.0		5.5		
	Conductivity A+H	X	X	X	X	X	X	350 ✓	X	X	X	X
12612	T (°C)											
	pH		7.5			7.5		7.4		7.6		
	DO (mg/L)		6.2			5.2		5.0		5.8		
	Conductivity A+H	X	X	X	X	X	X	360 ✓	X	X	X	X
12613	T (°C)											
	pH		7.6			7.5		7.5		7.6		
	DO (mg/L)		6.1			5.3		5.1		5.7		
	Conductivity A+H	X	X	X	X	X	X	360 ✓	X	X	X	X
12614	T (°C)											
	pH		7.7			7.6		7.6		7.4		
	DO (mg/L)		6.3			6.0		5.8		6.5		
	Conductivity A+H	X	X	X	X	X	X	350 ✓	X	X	X	X
	Init./Date (1999):	11/11 JM	11/12 JG	11/13 JG	11/14 JM	11/15 JG	11/16 [illegible]	11/17 JG	11/18 [illegible]	11/19 [illegible]	11/20 JG	11/21 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, then weekly.

Review: J Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 Test Start 10/20/99

		Day of Analysis										
Sample	Parameter	22	23	24	25	26	27	28	29	30	31	32
12622	T (ºC)											
	pH		7.6			7.6		7.5		7.4		
	DO (mg/L)		7.1			6.4		6.0		6.8		
	Conductivity A+H	X	X	X	X	X	X	350 ✓	X	X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	Init./Date (1999):	11/11 JM	11/12 JG	11/13 JG	11/14 JM	11/15 JG	11/16 AC	11/17 JG	11/18 cd	11/19 LG	11/20	11/21 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, then weekly.

Review: ______ Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 Test Start 10/20/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	43
		Day of Analysis										
12611	T (°C)	22.9/22.6	22.8/21.9	22.4/22.4	22.2/22.7	22.5/22.9	22.9/22.7	22.3/22.6	22.8/23.0	22.2/22.3	22.6/22.3	22.9/22.2
	pH	7.5		7.6		7.3			7.5		7.4	
	DO (mg/L)	5.3		5.9		6.9			6.4		3.2	
	Conductivity	X	X	340	X	X	X	X	X	X	330	X
12612	T (°C)									—	—	—
	pH	7.6		7.6		7.4			7.5	—	—	—
	DO (mg/L)	5.8		6.2		6.2			6.4	—	—	—
	Conductivity	X	X	350	X	X	X	X	330 ✓	X	—	X
12613	T (°C)									—	—	—
	pH	7.6		7.7		7.4			7.5	—	—	—
	DO (mg/L)	5.9		6.6		6.6			6.3	—	—	—
	Conductivity	X	X	350	X	X	X	X	320 ✓	X	—	X
12614	T (°C)										—	—
	pH	7.6		7.7		7.4			7.7	7.6	—	—
	DO (mg/L)	5.0		5.9		6.0			7.0	5.6	—	—
	Conductivity AHH/mmn	X	X	360	X	X	X	X	X	320 ✓	—	X
	Init./Date (1999):	11/22 JG	11/23 W	11/24	11/25 MR	11/26 W	11/27 JG	11/28 TM	11/29 JG	11/30 TM	12/1 TM	12/2 TM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, then weekly.

Review: J Date: 12/21/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 Test Start 10/20/99

Sample	Parameter	33	34	35	36	37	38	39	40	41	42	43
		Day of Analysis										
12622	T (°C)											
	pH	7.7		7.6		7.3			7.6		7.5	7.4
	DO (mg/L)	6.2		6.1		6.5			6.9		5.3	5.0
	Conductivity	X	X	350	X	X	X	X	X	X	350	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	Init./Date (1999):	11/22	11/23 CJ	11/24 CO	11/25 JM	11/26 Cl	11/27	11/28	11/29	11/30 TM	12/1 TM	12/2 TM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, then weekly.

Review: ______ Date: 12/21/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000110

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3629 Test Start 10/20/99

		Day of Analysis										
Sample	Parameter	44	45	46	47	48	49	50	51	52	53	54
12611	T (°C)	~~22.3~~	22.9	22.5	22.5							
	pH	7.4		7.3	7.3							
	DO (mg/L)	4.2		2.4	3.0							
	Conductivity AtH/pmm	X	X	340	~~X~~ 335	X	X	X	X	X		X
12612	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
12613	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
12614	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	Init./Date (1999):	12/3 TB	12/4 JG	12/5 JM	12/6 JM	12/7	12/8	12/9	12/10	12/11	12/12	12/13

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness at end of test for any samples ending.

Review: J Date: 12/14/99
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000111

Midge (*Chironomus tentans*) Chronic Toxicity Test
Day 20 Survival and Dry Weight Data

Client: Menzie-Cura & Assoc.	Project: 99033 Dead Creek	BTR: 3641
	Test Start: October 21, 1999	Day 20: November 10, 1999

Sample	Repl.	Initial # Larvae	# Alive	11/8/99 Init.	Larvae preserved? Y / N	Crucible #	# Weighed	Ashed Pan Wt.	Ashed Pan Wt. + Larval Dry Wt.	Ashed Pan and Ashed Larval Wt.
12665	I	12	0P11L0E	TM	Y	10	11	2,320.95	2,346.80	2,326.70
	J	12	0P2L1E	TM	Y	11	2	2,282.22	2,290.05	2,282.89
	K	12	1P8L0E	TM	Y	12	8	2,389.34	2,420.25	2,395.18
	L	12	1P1L8E	TM	Y	13	1	2,484.66	2,483.41	2,484.70
12668	I	12	3P3L1E	TM	Y	14	3	2,263.71	2,271.836 JG	2,263.70
	J	12	6P4L0E	TM	Y	15	4	2,385.22	2,398.17	2,386.84
	K	12	2P8L0E	TM	Y	16	8	2,426.14	2,448.78	2,430.38
	L	12	2P2L0E	TM	Y	17	2	2,444.70	2,453.15	2,445.07
	I	12			Y					
	J	12			Y					
	K	12			Y					
	L	12			Y					
	I	12			Y					
	J	12			Y					
	K	12			Y					
	L	12			Y					
	I	12			Y					
	J	12			Y					
	K	12			Y					
	L	12			Y					

Date / Time / Init. Larvae in oven: 11/26/99 16:45 Date / Time / Init. Larvae out of oven: 11/27 15:00 JG

Date / Time / Init. Larvae in furnace: 11/27 15:15 Date / Time / Init. Larvae out of furnace:

Balance QC: Initial (20 mg = 20.007) Final (20 mg = 2000.06) Balance Asset #:

Date/time In 11/26 16:45 Temp(°C) 80 Init. JG Date/time out 11/27 Temp(°C) 80 Init. JG

Comments: P = pupa, L = larva, E = fly previously emerged (larval casing left behind on water surface).

Reviewer: [signature] Date: 12/22/99

ctday20doc

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000142

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12665 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 C	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Egg case incubation Temp 24°C 11/24/99

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000113

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12665 D	# Males emerged			1								
	Male Time to Mortality (days)			6d 11/19								
	# Females emerged				1 1		1		1			
	Females Time to Mortality (days)				3d 11/17 5d 11/19		2d 11/17		5d 11/23			
	Cumulative number emerged				3		4		5			
	# Pairings				w/ 665D 11/13 w/ 665F ♂ 11/13		w/ 665F ♂ 11/16		w/ 665F ♂ 11/16			
	# Egg Case					A 1c	~~[illegible]~~	1c			1c	
	# Eggs / Time to hatch / # hatched					1,670 21 unhatched 11/22		1,548 5 unhatched 11/23	3 unhatched 11/24		616 165 unhatched 11/26 266 unhatched 11/27	
12665 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 F	# Males emerged			1		1	1			1 dead		
	Male Time to Mortality (days)			6d 11/19		8d 11/23	6d 11/22			0d 11/19		
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged					2	3			4		
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/11	11/12	11/13 JG	11/14 JG	11/15 JG	11/16 JM	11/17 JM	11/18 JM	11/19 JM	11/20 JG	11/21

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12665 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 H (*)	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged	1*										
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/11 JM	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:
(*) One emergent case found in sample 12665H
prior to installing emergent traps 11/10/99 JM

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000115

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12665 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 C	# Males emerged											
	Male Time to Mortality (days)								~~0 L~~ JM 1			
	# Females emerged								~~0 P~~ JM			
	Females Time to Mortality (days)								~~JM 11/29~~ JM			
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = Larvae

1 wrote in wrong sample # JM 11/29

Review: J Date: 12/22/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000140

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12665 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 E	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 F	# Males emerged						*					
	Male Time to Mortality (days)						1 dead emerging					
	# Females emerged			1			fly -					
	Females Time to Mortality (days)			5d 11/29			sex unknown.					
	Cumulative number emerged			5								
	# Pairings			w/665P 11/23								
	# Egg Case					1° 1,104						
	# Eggs / Time to hatch / # hatched					24 unh. 12/2 8 unh. 12/3						
	Init./Date (1999)	11/22	11/23	11/24 JM	11/25	11/26	11/27 JG	11/28	11/29	11/30	12/1	12/2

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

(1.) (1.) Test Date Correction J 11/30/99

Review: J Date: 12/22/99

ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000142

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42 (1)
12665 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged											
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments: (1) Test Date Correction 11/30/99

Review: ______ Date: 12/22/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12665 A	# Males emerged											
	Male Time to Mortality (days)		0L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 B	# Males emerged											
	Male Time to Mortality (days)		0L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 C	# Males emerged											
	Male Time to Mortality (days)		0L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/3	12/4 JS	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: J Date: 12/22/99 ctdays43-53

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12665 D	# Males emerged											
	Male Time to Mortality (days)		0L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 E	# Males emerged											
	Male Time to Mortality (days)		2L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 F	# Males emerged											
	Male Time to Mortality (days)		0L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: _______ Date: 12/22/99

ctdays43-53

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	43	44	45	46	47	48	49	50	51	52	53
12665 G	# Males emerged											
	Male Time to Mortality (days)		0L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12665 H	# Males emerged											
	Male Time to Mortality (days)		0L									
	# Females emerged		0P									
	Females Time to Mortality (days)											
	Cumulative number emerged											
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	12/3	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: [signature] Date: 12/22/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays43-53

000151

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12668 A	# Males emerged	1				1						
	Male Time to Mortality (days)	6d 11/17				4d 11/19						
	# Females emerged			1		1 1	1	1		1		
	Females Time to Mortality (days)			2d 11/15		3d 11/18 3d 11/18	4d 11/20	Not recorded		6d 11/25		
	Cumulative number emerged	1		2		~~3~~ 5	6	7		8		
	# Pairings			w/668D ♂ 11/12		w/668F ♂	w/668A ♂ w/668[illegible]	~~w/668G ♂ 11/17~~		w/668[illegible] ♂		
	# Egg Case				1° ~46 (pale)⊛		1°			1° 432	1° 1,913	~200 unhatched 11/26
	# Eggs / Time to hatch / # hatched				0% hatch 11/19		1,278 115 unhatched 11/22			74 unhat. 11/25 40 unhatched 11/26		~100 unhatched 11/27
12668 B	# Males emerged						1					1 1
	Male Time to Mortality (days)						4d 11/20					1d 11/22 4d 11/25
	# Females emerged							1	1	1 1		
	Females Time to Mortality (days)							5d 11/22	5d 11/23	4d 11/23 4d 11/23		
	Cumulative number emerged							2	3 w/668E 11/16?	5		7
	# Pairings							w/668G ♂ 11/17	w/668D ♂	w/668F ♂ w/Ⓐ 668F ♂		11/18 ♀ w/668C ♂ 11/18
	# Egg Case								1° ~1512			1° 11/19
	# Eggs / Time to hatch / # hatched								~150 unhatched 11/24 ~150 unhatched 11/25			
12668 C ③	# Males emerged				1D 1 Alive	1		1 1				
	Male Time to Mortality (days)				6d 11/20 0d 11/14	2d 11/17		7d 11/24 5d 11/22				
	# Females emerged					1		1	1			
	Females Time to Mortality (days)					2d 11/17		4d 11/21	4d 11/22			
	Cumulative number emerged				2	4		~~6~~ 7	8			
	# Pairings					1		1	w/668 D ♂ 11/18			
	# Egg Case						1° 1,372			1° Ⓐ 140		
	# Eggs / Time to hatch / # hatched					② Day 6 ~250 unhatched		11/23 ~175 unhatched		7 unhatched 11/25 45 unhatched 11/26		
	Init./Date (1999)	11/11 JM	11/12	11/13 JG	11/14 JG	11/15 JG	11/16 JM	11/17 JG	11/18 JM	11/19 JM	11/20 JG	11/21 JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

⊛ eggcase appears pale, few viable-looking eggs; counted ~46. 11/14/99 JG

12/22/99

② Active hatching still occurring 11/22

Review: ______ Date:

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

① was written in the wrong place JM 11/18

③ 668C → when broken down, many young C. tentans larvae ... an egg case must have been missed JM 11/29

Ⓐ This was probably a 2° egg case

000152

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12668 D	# Males emerged		1			1	1 1	1 1	1 1 JG			
	Male Time to Mortality (days)		5d 11/17			3d 11/18	Not rec. 3d 11/19	4d 11/24 6d 11/23	3d 11/21 ~~6d~~ 6d 11/24 JM			
	# Females emerged					1	1					
	Females Time to Mortality (days)					3d 11/18	Not rec.					
	Cumulative number emerged					~~2~~ 3	~~4~~ 5	~~6~~ 8	~~9~~ 10 JM			
	# Pairings						1					
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12668 E	# Males emerged			1		1	1 1		1D	1D		1
	Male Time to Mortality (days)			7d 11/20		3d 11/18	4d 11/20 5d 11/21	-	0d 11/18	0d 11/19		7d 11/28
	# Females emerged			~~1~~ JG			1					
	Females Time to Mortality (days)						2d 11/18					
	Cumulative number emerged					2				7		8
	# Pairings						1					
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12668 F	# Males emerged				1 1	1		1	1	1 1		
	Male Time to Mortality (days)				6d 11/20 6d 11/20	Not rec.		6d 11/23	6d 11/24	4d 11/23 4d 11/23		
	# Females emerged					1 1			1			1
	Females Time to Mortality (days)					2d 11/17 JG 2d			6d 11/24			4d 11/25
	Cumulative number emerged				2	~~3~~ 4		5	6	~~8~~ 10		11
	# Pairings					w/668E ♂			1			w/668 E3
	# Egg Case						1° 528				1° ~175	
	# Eggs / Time to hatch / # hatched						32 unhatched 11/22				0% hatch disintegrated 11/27	
	Init./Date (1999)	11/11	11/12 JG	11/13 JG	11/14 JG	11/15 JG	11/16 JM	11/17 JM	11/18 JM	11/19 JM	11/20 JG	11/21 JM

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Review: ______ Date: 12/22/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

Sample / Repl.	Response	21	22	23	24	25	26	27	28	29	30	31
12668 G	# Males emerged		3 (2 alive) (1 dead)			1	1D	1		1		
	Male Time to Mortality (days)		5d 11/17 5d 11/17 0d 11/12			4d 11/19	0d 11/16	6d 11/23		6d 11/25		
	# Females emerged					1	1			1		
	Females Time to Mortality (days)					3d 11/18	2d 11/18			6d 11/25		
	Cumulative number emerged		3			~~5~~ 5 JG	7			~~9~~ 10 JG		
	# Pairings					1	1 w/12668 B 11/16			1		
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12668 H	# Males emerged		1							1		
	Male Time to Mortality (days)		missing? escaped? 11/14							5d 11/24		
	# Females emerged			1								
	Females Time to Mortality (days)			4d 11/17								
	Cumulative number emerged			2						3		
	# Pairings			w/668E? 11/13								
	# Egg Case				1 est. 1,144							
	# Eggs / Time to hatch / # hatched				16 unhatched 11/21							
	Init./Date (1999)	11/11	11/12 JG	11/13 JG	11/14 JG	11/15 JG	11/16 JM	11/17 JM	11/18 JM	11/19 JG	11/20	11/21

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa

Comments:

Review: ______ Date: 12/22/99

ctdays21-31

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

11/19 pair

Sample / Repl.	Response	32	33	34	35	36	37	38	39	40	41	42
12668 A	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged								0L			
	Females Time to Mortality (days)								0P			
	Cumulative number emerged								11/29 TG			
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12668 B	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged								0L			
	Females Time to Mortality (days)								0P			
	Cumulative number emerged								11/29 TM			
	# Pairings											
	# Egg Case	B 1°										
	# Eggs / Time to hatch / # hatched	763 ~200 unh	11/28									
12668 C	# Males emerged	~200 unh	11/29 egg case disintegrating									
	Male Time to Mortality (days)											
	# Females emerged								0L			
	Females Time to Mortality (days)								0P			
	Cumulative number emerged								11/29 TM			
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/22 TM	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa   L = larva

Review: ______ Date: 12/22/99   ctdays32-42

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/19/99

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12668 D	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged								0L			
	Females Time to Mortality (days)								0P			
	Cumulative number emerged								11/29 JM			
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12668 E	# Males emerged	1										
	Male Time to Mortality (days)	4d 11/26										
	# Females emerged								0L			
	Females Time to Mortality (days)								0P			
	Cumulative number emerged	9							11/29 JM			
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
12668 F	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged								0L			
	Females Time to Mortality (days)								0P			
	Cumulative number emerged								11/29 JG			
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/22 JM	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa L = larva

(1) Test Date Correction JG 11/30/99

Review: [signature] Date: 12/22/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

000156

Midge (*Chironomus tentans*) Chronic Toxicity Test Biological Monitoring

Project: 99033 M-C Dead Creek	BTR: 3641	Test Start: 10/21/99

1

Sample / Repl.	Response	~~21~~ 32	~~22~~ 33	~~23~~ 34	~~24~~ 35	~~25~~ 36	~~26~~ 37	~~27~~ 38	~~28~~ 39	~~29~~ 40	~~30~~ 41	~~31~~ 42
12668 G	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged	1							OL			
	Females Time to Mortality (days)	3d 11/25							OP			
	Cumulative number emerged	~~10~~ W 11							TM 11/29			
	# Pairings	w/ 1668E ♂			0% hatch 11/30 (*1)							
from 11/19 pair	# Egg Case			1 10-1547 1-1090	0% hatch 11/30 (*1)							
	# Eggs / Time to hatch / # hatched											
12668 H	# Males emerged											
	Male Time to Mortality (days)											
	# Females emerged								OL			
	Females Time to Mortality (days)								OP			
	Cumulative number emerged								TM 11/29			
	# Pairings											
	# Egg Case											
	# Eggs / Time to hatch / # hatched											
	Init./Date (1999)	11/22 JM	11/23	11/24 JM	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2

Emergence scoring: Record any pupae which die (D) before emergence. D = dead for flies which emerge but are not surviving. P = pupa ~~I = pup~~ L = larva

Comments:

(*1) 12/1 → couldn't do a day 7 hatching count, egg cases discarded 11/30 TM

000157

Review: ______ Date: 12/22/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

ctdays32-42

(1) Test Date Correction

J 11/30/99

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/17			No. of Egg Cases 2		
Date (1999)	**# Days Post-Deposit**	**Temperature (°C)**	**Feeding (*Selenastrum*)**	**Observations**	**Test Use**
10/17	0	~~20.7~~			
10/18	1	20.7			
10/19	2				
10/20	3				
10/21	4	22.5			C.T. chronic
	5				
Source of egg cases: Aquatec cultures					

000158

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/18			No. of Egg Cases 8		
Date (1999)	**# Days Post-Deposit**	**Temperature (°C)**	**Feeding (*Selenastrum*)**	**Observations**	**Test Use**
10/18	0				
10/19	1				
10/20	2				
10/21	3	22.5			C.T. Chronic
	4				
	5				
Source of egg cases: Aquatec cultures					

000159

Collection of Chironomus tentans Egg Cases for Chronic Toxicity Tests

Egg Case Deposit Date: 10/29 ~~29~~ JG			No. of Egg Cases 8		
Date (1999)	# Days Post-Deposit	Temperature (°C)	Feeding (*Selenastrum*)	Observations	Test Use
10/29 ~~29~~ JG	0		✓		
10/30	1		✓		
10/31	2	23.1	✓	Hatching	AUX MALES
	3				
	4				
	5				
Source of egg cases: Aquatec					

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/21/99

Sample	Parameter	0	1	2	3	4	5	6	7	8	9	10
		Day of Analysis										
12665	T (°C)	22.7	22.7	22.8/23.0	22.8/22.4	22.9/23.0	22.7/23.0	22.7/22.7	22.7/22.9	22.7/23.0	22.7/22.7	22.7/22.7
	pH	7.7	7.8			7.6		7.5		7.5	—	—
	DO (mg/L)	6.8	6.8			5.5		5.0		4.6	—	—
	Conductivity	350 ✓	X	X	X	X	X	X	330	X	X	X
12668	T (°C)	23.1	22.8							23.4/23.6	22.9/22.9	
	pH	7.1	7.4			7.7		7.7		7.7	—	—
	DO (mg/L)	7.3	6.8			6.2		6.2		5.9	—	—
	Conductivity	370 ✓	X	X	X	X	X	X	345	X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity		X	X	X	X	X	X		X	X	X
	Init./Date (1999):	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.
Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

↑
Day 9 -- Setup
Aux Male beakers

Review: ____ Date: 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: ~~3529~~ 3641 Test Start 10/~~20~~ 21/99

Sample	Parameter	11	12	13	14	15	16	17	18	19	20	21
		Day of Analysis										
12665	T (°C)	22.7 / 22.7	22.7	22.5 / 22.6	22.6 / 22.6	22.7 / 22.7	22.2 / 22.4	22.8 / 22.7	22.7 / 22.3	22.7 / 22.4	23.2	22.7 / 23.5
	pH	7.5		7.5		7.5			7.6		7.6	
	DO (mg/L)	6.3		4.7		5.5			7.0		4.0	
	Conductivity	X	X	X	370	X	X	X	X	X	380	X
12668	T (°C)		22.8								22.8	
	pH	7.7		7.7		7.6			7.8		7.5	
	DO (mg/L)	6.6		5.8		6.0			7.2		5.5	
	Conductivity	X	X	X	370	X	X	X	X	X	370	X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X		X	X	X	X	X		X
	Init./Date (1999):	11/1 JG	11/2 JM	11/3 JG	11/4	11/5	11/6	11/7 JM	11/8 JG	11/9 TM	11/10 (*1) TM	11/11 JM

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, 40, and end of test.

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

(*1) 12668 H → one emergent case was found on the water surface prior to emergence falling rops 11/10/99 JM

000132

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/21/99

Sample	Parameter	Day of Analysis 22	23	24	25	26	27	28	29	30	31	32
12665	T (ºC)	22.2	22.6	22.6	22.4	22.8	22.5	22.6	22.8	23.0	22.9	22.6
	pH	7.6			7.5		7.0	7.5				7.5
	DO (mg/L)	6.6			6.0		5.2	6.3				5.0
	Conductivity	X	X	X	X	X	X	340	X	X	X	X
12668	T (ºC)	22.6	22.8	23.1	22.5	22.7	22.4	22.8	23.0	23.1	23.5	22.7
	pH	7.6			7.5		7.4	7.6				7.6
	DO (mg/L)	6.6			6.1		5.5	6.5				6.2
	Conductivity	X	X	X	X	X	X	345	X	X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X	X	X	X	X		X	X	X	X
	Init./Date (1999):	11/12 JG	11/13 JG	11/14 JM	11/15 JG	11/16	11/17 JG	11/18	11/19 JM	11/20 JG	11/21 JM	11/22 JG

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, then weekly.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000103

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/21/99

Sample	Parameter	Day of Analysis: 33	34	35	36	37	38	39	40	41	42	43
12665	T (ºC)	22.2	22.6	22.5	22.3	22.4	22.0	22.5	22.6	22.3	22.9	22.2
	pH		7.7	7.5				7.6		7.4	7.3	7.4
	DO (mg/L)		5.8	3.8				6.3		2.9	3.0	4.0
	Conductivity Alk/Amm.	X	X	330 ✓	X	X	X	X	X	X	340	X
12668	T (ºC)	22.6	22.7	23.0	22.7	22.8	22.5	22.8	—	—	—	—
	pH		7.6	7.4				7.6	—	—	—	—
	DO (mg/L)		5.7	4.9				6.8	—	—	—	—
	Conductivity Alk/Amm.	X	X	340 ✓	X	X	X	X 330 ✓	X	X	—	X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	T (ºC)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	Init./Date (1999):	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2	12/3

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness samples on Days 0, 14, 20, then weekly.

Review: ______ Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000164

Midge (*Chironomus tentans*) Overlying Water Environmental Monitoring: Chronic Toxicity Tests

Project: Menzie-Cura & Associates	Project: 99033 Dead Creek	BTR: 3641 Test Start 10/21/99

		Day of Analysis										
Sample	Parameter	44	45	46	47	48	49	50	51	52	53	54
12665	T (°C)	JG 22.8										
	pH	~~7.4~~ 7.74										
	DO (mg/L)	JG 7.0										
	Conductivity	X 340	X		X	X	X	X	X	X		X
~~12668~~	~~T (°C)~~											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	T (°C)											
	pH											
	DO (mg/L)											
	Conductivity	X	X		X	X	X	X	X	X		X
	Init./Date (1999):	~~12/4~~ JG	12/5 TM	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14

Comments: Measured temperature is a measurement of a representative beaker placed within the test array for this testing group.

Measure D.O. and pH 3 times weekly, conductivity once weekly. Collect ammonia, alkalinity, and hardness at end of test for any samples ending.

Review: C Date: 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000165

ALKALINITY AND HARDNESS

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
12548									
	10/19/99	50	4.6	6.9	46	50	17.7	26.8	182.0
	11/8/99	50	28	29.6	32	30	0.2	3.7	116.7
	12/9/99	50	2.8	4.7	38	50	4.5	10.2	114.0
Avg					38.7				137.6
Min					32				114
Max					46				182
12550									
	10/19/99	50	9.1	11.2	42	50	36.7	45.7	180.0
	11/8/99	50	33	34.7	34	30	10.5	14.5	133.3
	11/29/99	50	25.2	26.8	32	50	4	8.2	84.0
Avg					36.0				132.4
Min					32				84
Max					42				180
12551									
	10/19/99	50	11.2	13.4	44	50	0.1	9	178.0
	11/8/99	50	36.6	38.2	32	30	15.5	21.8	110.0
	11/29/99	50	26.8	28.7	38	50	8.2	12.4	84.0
Avg					38.0				124.0
Min					32				84
Max					44				178
12552									
	10/19/99	50	13.4	15.9	50	50	9	19.6	212.0
	11/8/99	50	39.8	41.4	32	30	25.2	28.9	123.3
	12/3/99	50	32.4	33.9	30	50	0.2	5.9	114.0

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
Avg					37.3				149.8
Min					30				114
Max					50				212
12592									
	10/19/99	50	21.6	23.6	40	50	18.2	27.5	186.0
	11/8/99	50	41.4	43.3	38	30	28.9	32.7	126.7
	12/6/99	50	35.5	37.1	32	50	11.1	16.8	114.0
Avg					36.7				142.2
Min					32				114
Max					40				186
12593									
	10/19/99	50	23.6	25.4	36	50	27.5	37.1	192.0
	11/8/99	50	43.3	45.1	36	30	32.7	36.9	140.0
	12/7/99	50	38.6	40.3	34	50	21.8	27.1	106.0
Avg					35.3				146.0
Min					34				106
Max					36				192
12609									
	10/19/99	50	25.4	27.5	42	50	37.1	46.6	190.0
	11/8/99	50	45.1	47.1	40	30	36.9	41	136.7
	11/30/99	50	21.9	23.7	36	50	41.8	46.3	90.0
	12/13/99	50	19.9	21.9	40	50	36.7	41.8	102.0
Avg					39.5				129.7
Min					36				90
Max					42				190
12611									
	10/20/99	50	34.2	35.8	32	50	6.7	12.1	108.0
	11/3/99	50	24.1	25.8	34	50	41.1	48.4	146.0
	11/9/99	50	41.5	43.1	32	50	6.4	13.2	136.0

Sample Number	Date	Alkalinity Volume (mls)	Initial Titrant	Final Titrant	Alkalinity (mg/l)	Hardness Volume (mls)	Initial Titrant	Final Titrant	Hardness (mg/l)
	12/6/99	50	37.1	38.6	30	50	16.8	21.8	100.0
Avg					32.0				122.5
Min					30				100
Max					34				146
12612									
	10/20/99	50	35.8	37.5	34	50	12.1	17.7	112.0
	11/3/99	50	25.8	27.8	40	50	0.2	8.1	158.0
	11/9/99	50	43.1	44.5	28	50	13.2	20	136.0
	11/29/99	50	28.7	30.3	32	50	12.4	16.7	86.0
Avg					33.5				123.0
Min					28				86
Max					40				158
12613									
	10/20/99	50	37.5	39.2	34	50	17.7	23.6	118.0
	11/3/99	50	27.8	29.6	36	50	8.1	15.7	152.0
	11/9/99	50	44.5	46.2	34	50	20	26.9	138.0
	11/29/99	50	30.3	31.9	32	50	16.7	21	86.0
Avg					34.0				123.5
Min					32				86
Max					36				152
12614									
	10/20/99	50	0.1	1.8	34	50	23.6	29.1	110.0
	11/3/99	50	29.6	31.4	36	50	15.7	23.1	148.0
	11/9/99	50	46.2	47.6	28	50	26.9	33.3	128.0
	11/30/99	50	29.2	30.8	32	50	30.3	36.4	122.0
Avg					32.5				127.0
Min					28				110
Max					36				148
12622									

Sample Number	*Date*	*Alkalinity Volume (mls)*	*Initial Titrant*	*Final Titrant*	*Alkalinity (mg/l)*	*Hardness Volume (mls)*	*Initial Titrant*	*Final Titrant*	*Hardness (mg/l)*
	10/20/99	50	4.2	6.1	38	50	34.4	39.7	106.0
	11/3/99	50	33.1	34.9	36	50	29.5	36.9	148.0
	11/9/99	50	48.8	50	24	50	38.8	45.3	130.0
	12/2/99	50	30.8	32.4	32	50	36.4	41.5	102.0
Avg					*32.5*				*121.5*
Min					*24*				*102*
Max					*38*				*148*
12665									
	10/21/99	50	6.1	7.6	30	50	0.5	6.1	112.0
	11/10/99	50	25	26.8	36	50	33.4	40.8	148.0
	11/18/99	50	20.2	22.1	38	50	22.5	30.2	154.0
	12/4/99	50	33.9	35.5	32	50	5.9	11.1	104.0
Avg					*34.0*				*129.5*
Min					*30*				*104*
Max					*38*				*154*
12668									
	10/21/99	50	7.6	9.7	42	50	6.1	11.3	104.0
	11/10/99	50	29.4	31	32	50	5.6	13	148.0
	11/18/99	50	25.6	27.3	34	50	0	6.8	136.0
	11/29/99	50	23.7	25.2	30	50	0	4	80.0
Avg					*34.5*				*117.0*
Min					*30*				*80*
Max					*42*				*148*

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3615
Sample Description: Day 0 10/19		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12546	10/19	50ml	0.2	2.3	12/2 ys	50ml	0.1	11.6	12/7 ys	12/21 ys
47			2.3	4.6		30ml	11.6	17.7		
48			4.6	6.9		50ml	17.7	26.8		
49			6.9	9.1			26.8	30.7		
50			9.1	11.2			30.7	45.7		
51			11.2	13.4			0.1	9.0		
152			13.4	15.9			9.0	19.6		

J 12/8/99

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: 3622
Sample Description: Day 0 H.a 10/19		

*: ct auSO

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12589	10/19	50ml	15.9	17.8	12/2 as	50ml	26.6	33.7	12/7 as	12/21 as
90			17.8	19.7			33.7	40.7		
91			19.7	21.6			0.2	18.2		
* 92			21.6	23.6			18.2	27.5		
* 93			23.6	25.4			27.5	37.1		
* 12609			25.4	27.5			37.1	46.6		
610			27.5	29.5			0.1	11.7		

J 12/8/99

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: Day 0 H. a + CT 10/20 chronic		

* = C.T. also

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
	12589	10/20	50ml	22.5	24.3	12/8 ys	50ml	14.8	20.6	12/8 ys	12/8 ys
	90			24.3	26.1			20.6	26.6		
	91			26.1	27.7		40ml	26.6	35.0		
ys*	92			27.7	29.4		20ml	35.0	37.3		
ys*	93		25ml	29.4	30.3			37.3	40.1		
ys*	12609		50ml	30.3	32.3		30ml	40.1	44.5		
	610			32.3	34.2		40ml	0.2	6.7		
*	611			34.2	35.8		50ml	6.7	12.1		
*	612			35.8	37.5			12.1	17.7		
*	613			37.5	39.2			17.7	23.6		
*	614			0.1	1.8			23.6	29.1		
	615			1.8	4.2		40ml	29.1	34.4		
*	622			4.2	6.1		50ml	34.4	39.7		

Alkalinity and Hardness Analysis

Client: Menzie - Cura	Project: 99033	BTR: Several
Sample Description: Day 0		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
Ct. 126665	10/21	50ml	6.1	7.6	12/8 [illegible]	50ml	0.5	6.1	12/8 [illegible]	12/8 [illegible]
126668	⊥	⊥	7.6	9.7	⊥	⊥	6.1	11.3	⊥	
126664	10/22	50ml	9.7	11.2	12/8 [illegible]	50ml	11.3	17.3	12/8 [illegible]	
665			11.2	13.1			17.3	22.8		
666			13.1	15.0			22.8	28.2		
668			15.0	16.6			28.2	33.1		
671			16.6	18.3			33.1	38.0		

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: Day 20 H.a. + C.t.		

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
Ha.	546	11/8	50ml	22.9	24.4	11/30 YS	30ml*	37.8	41.1	11/30 YS	12/8 YS
	547			24.4	26.0			41.1	44.2		
	~~548~~			26.0	28.0			44.2	47.8		
C.t.	548			28.0	29.6			0.2	3.7		
Ha.	549			29.6	31.3			3.7	7.0		
	550			31.3	33.0			7.0	10.5		
C.t.	550			33.0	34.7			10.5	14.5		
H.a.	551			34.7	36.6			14.5	18.5		
C.t.	551			36.6	38.2			18.5	21.8		
Ha.	552			38.2	39.8			21.8	25.2		
C.t	552			39.8	41.4			25.2	28.9		
	592			41.4	43.3			28.9	32.7		
	593			43.3	45.1			32.7	36.9		
	609			45.1	47.1			36.9	41.0		

*used 30 ml sample (running out of Calgamite)

Alkalinity and Hardness Analysis

Client: MenziеCura	Project: 99033	BTR: Several
Sample Description: Day 20		

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
H.a	12589	11/9/99	50ml	32.3	33.9	11/20 LS	50ml	17.0	23.1	11/20 LS	12/8 YB
	12590			33.9	35.3			23.1	28.8		
	12592			35.3	36.7			28.8	34.3		
	12593			36.7	38.1			34.3	40.5		
	12609			38.1	39.9			40.5	46.7		
	12610			39.9	41.5			0.6	6.4		
ct.	12611			41.5	43.1			6.4	13.2		
	12612			43.1	44.5			13.2	20.0		
	12613			44.5	46.2			20.0	26.9		
	12614			46.2	47.6			26.9	33.3		
H.a.	12615			47.6	48.8			33.3	38.8		
c.t	12622			48.8	50.0			38.8	45.3		

Alkalinity and Hardness Analysis

Client: Munzie-Cura	Project: 99033 -	BTR: Several
Sample Description: Day 20		

			ALKALINITY				HARDNESS				
	Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
Ha	12664	11/11	50ml	22.0	23.5	LS 11/20	50ml	20.8	27.2	11/20 YS	12/8 YS
Ha.	12665	11/11		23.5	25.0			27.2	33.4		
Ct	12665	11/10		25.0	26.8			33.4	40.8		
Ha	12666	11/11		26.8	28.3			40.8	46.9		
Ha	12668	11/11		28.3	29.4			0.1	5.6		
Ct.	12668	11/10		29.4	31.0			5.6	13.0		
Ha.	12671	11/11		31.0	32.3			13.0	19.4		

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: C.t. Chronic test end		

Day	Sample ID	Sample Date	ALKALINITY Sample Vol.	ALKALINITY Titrant Init. Vol.	ALKALINITY Titrant Final Vol.	ALKALINITY Analyst Date/ Init.	HARDNESS Sample Vol.	HARDNESS Titrant Init. Vol.	HARDNESS Titrant Final Vol.	HARDNESS Analyst Date/ Init.	Data entered Init.
41	12614	11/30	50ml	29.2	30.8	12/8 [illegible]	50ml	30.3	36.4	12/8 [illegible]	12/8 [illegible]
	12622	12/2		30.8	32.4			36.4	41.5		
	12552	12/3		32.7	33.9			0.2	5.9		
	12665	12/4		33.9	35.5			5.9	11.1		
48	12592	12/6		35.5	37.1			11.1	16.8		
47	12611	12/6		37.1	38.6			16.8	21.8		
49	12593	12/7		38.6	40.3			21.8	27.1		

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99 033	BTR: Several
Sample Description: Ct test end		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
t. day 51 12548	12/9	50ml	2.8	4.7	12/9 ys	50ml	4.5	10.2	12/9 ys	12/21 ys

Alkalinity and Hardness Analysis

Client: Menzie-Cura	Project: 99033	BTR: Several
Sample Description: Test end O.T.		

		ALKALINITY				HARDNESS				
Sample ID	Sample Date	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Sample Vol.	Titrant Init. Vol.	Titrant Final Vol.	Analyst Date/ Init.	Data entered Init.
12609	12/13	50	19.9	21.9	12/21 YS	50	30.7	41.8	12/21 YS	12/21 YS
12609	11/30	50	21.9	23.7	12/21 TM	50	41.8	46.3	12/21 TM	
12608	11/29	50	23.7	25.2	12/21 TM	50	0.0	4.0	12/21 TJM	
12550	11/29	50	25.2	26.8	12/21 TM	50	4.0	8.2	12/21 TM	
12551	11/29	50	26.8	28.7	12/21 TJM	50	8.2	12.4	12/21 TM	
12612	11/29	50	28.7	30.3	12/21 TJM	50	12.4	16.7	12/21 TM	
12613	11/29	50	30.3	31.9	12/21 TJM	50	16.7	21.0	12/21 TM	

Ammonia Results Report

Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
12548	BTOX-C-3	CT	11/30	0.1
12548	BTOX-C-3	CT	12/9	0.5
12548	BTOX-C-3	IN	10/19	4.1
12548	BTOX-C-3	CT	11/16	0.6
12548	BTOX-C-3	CT	11/8	2
		Avg: 1.46	Max: 4.1	Min: 0.1
12550	BTOX-D-2	CT	11/16	0.4
12550	BTOX-D-2	CT	11/8	0.2
12550	BTOX-D-2	CT	11/29	0.5
12550	BTOX-D-2	IN	10/19	2.2
		Avg: 0.83	Max: 2.2	Min: 0.2
12551	BTOX-D-3	CT	11/8	0
12551	BTOX-D-3	IN	10/19	1.5
12551	BTOX-D-3	CT	11/29	0.5
12551	BTOX-D-3	CT	11/16	0.1
		Avg: 0.53	Max: 1.5	Min: 0
12552	HA LCS	CT	11/8	0.7
12552	HA LCS	CT	11/16	0.1
12552	HA LCS	IN	10/19	0.2
12552	HA LCS	CT	11/30	0
12552	HA LCS	CT	12/3	0.1
		Avg: 0.22	Max: 0.7	Min: 0
12592	BTOX-B-3	CT	11/16	0
12592	BTOX-B-3	CT	10/19	1.6

Ammonia Results Report

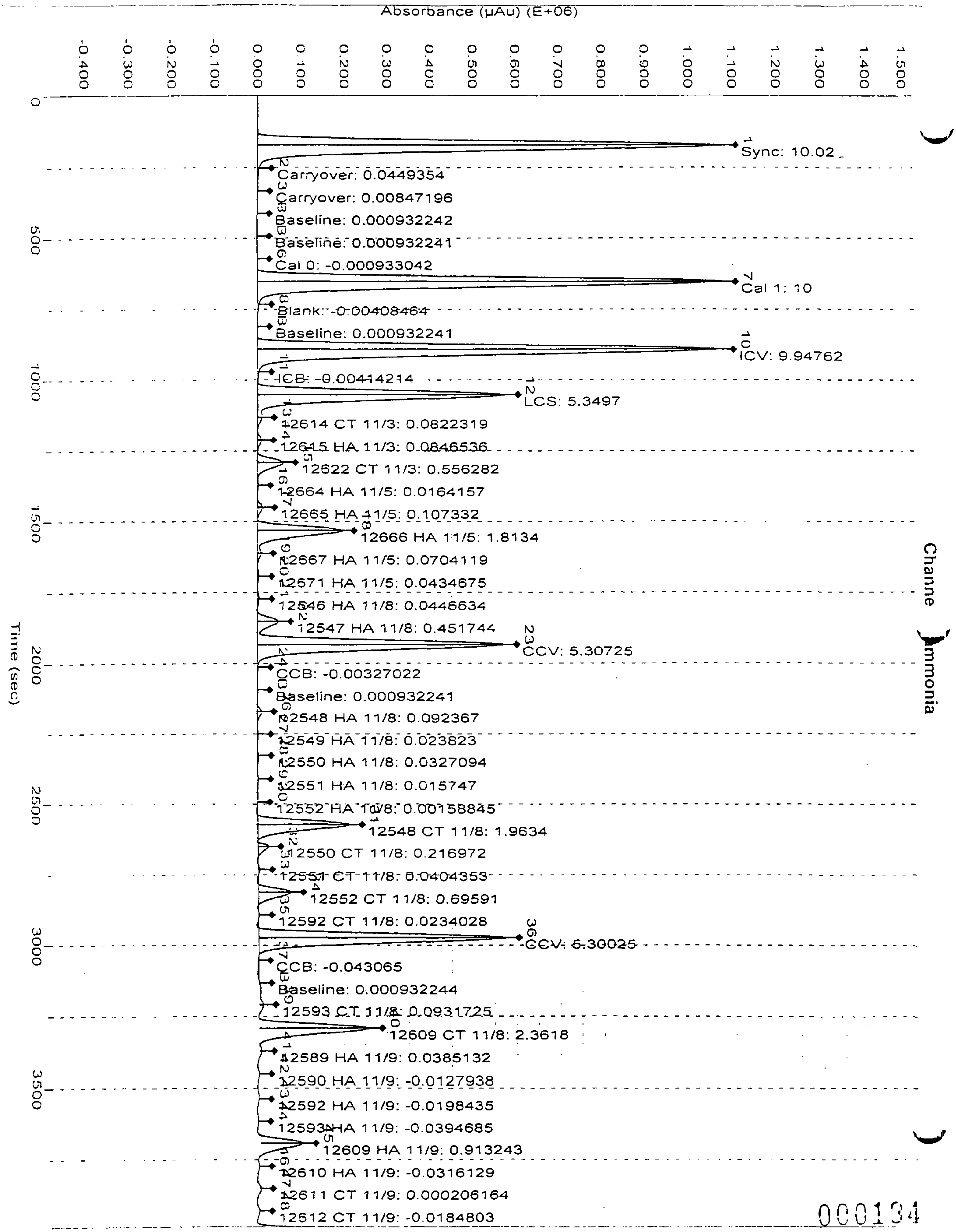
Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
12592	BTOX-B-3	CT	12/6	0.1
12592	BTOX-B-3	CT	11/30	0
12592	BTOX-B-3	CT	11/8	0.1
		Avg: 0.36	Max: 1.6	Min: 0
12593	BTOX-M	CT	11/16	0.1
12593	BTOX-M	CT	11/30	0.1
12593	BTOX-M	CT	11/8	0.1
12593	BTOX-M	CT	10/19	3
12593	BTOX-M	CT	12/7	0.1
		Avg: 0.68	Max: 3	Min: 0.1
12609	E-1 DEAD CREEK	CT	11/30	0.5
12609	E-1 DEAD CREEK	CT	11/16	1.6
12609	E-1 DEAD CREEK	CT	11/8	2.4
12609	E-1 DEAD CREEK	CT	12/13	0.5
12609	E-1 DEAD CREEK	CT	10/19	0.1
		Avg: 1.04	Max: 2.4	Min: 0.1
12611	E-3 DEAD CREEK	CT	10/20	2.9
12611	E-3 DEAD CREEK	CT	12/6	0.2
12611	E-3 DEAD CREEK	CT	11/17	0.1
12611	E-3 DEAD CREEK	CT	11/9	0
		Avg: 0.8	Max: 2.9	Min: 0
12612	BP-1 BORROW PIT	CT	11/9	0
12612	BP-1 BORROW PIT	CT	11/17	0.1
12612	BP-1 BORROW PIT	CT	10/20	0.6

Ammonia Results Report

Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
12612	BP-1 BORROW PIT	CT	11/29	0.5
		Avg: 0.3	Max: 0.6	Min: 0
12613	BP-1(DUPE) BORRO	CT	11/9	0.1
12613	BP-1(DUPE) BORRO	CT	10/20	0.8
12613	BP-1(DUPE) BORRO	CT	11/29	0.5
12613	BP-1(DUPE) BORRO	CT	11/17	0.1
		Avg: 0.38	Max: 0.8	Min: 0.1
12614	BP-3 BORROW PIT	CT	11/3	0.1
12614	BP-3 BORROW PIT	CT	11/17	0
12614	BP-3 BORROW PIT	CT	11/30	0
12614	BP-3 BORROW PIT	CT	11/9	0
12614	BP-3 BORROW PIT	CT	10/20	1
		Avg: 0.22	Max: 1	Min: 0
12622	LCS	CT	10/20	0.1
12622	LCS	CT	11/17	0
12622	LCS	CT	11/9	0.1
12622	LCS	CT	11/3	0.6
12622	LCS	CT	12/2	0
		Avg: 0.16	Max: 0.6	Min: 0
12665	PRAIRIE DUPONT CR	CT	10/21	0.1
12665	PRAIRIE DUPONT CR	CT	11/10	0.2
12665	PRAIRIE DUPONT CR	CT	12/4	0.2
12665	PRAIRIE DUPONT CR	CT	11/18	0.2

Ammonia Results Report

Sample Number	Client Sample Identifier	Species	Date	Ammonia Concentration (mg/l)
		Avg: 0.18	Max: 0.2	Min: 0.1
12668	LCS: 10/8/99 @ : (SE	CT	11/29	0.5
12668	LCS: 10/8/99 @ : (SE	CT	10/21	0.1
12668	LCS: 10/8/99 @ : (SE	CT	11/10	0.3
12668	LCS: 10/8/99 @ : (SE	CT	11/18	0
		Avg: 0.23	Max: 0.5	Min: 0


Absorbance (µAu) (E+06)
-0.400 -0.300 -0.200 -0.100 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.100 1.200 1.300 1.400 1.500
Time (sec)
0 500 1000 1500 2000 2500 3000 3500
Channel Ammonia
Sync: 10.02
Carryover: 0.0449354
Carryover: 0.00847196
Baseline: 0.000932242
Baseline: 0.000932241
Cal 0: -0.000933042
Cal 1: 10
Blank: -0.00408464
Baseline: 0.000932241
ICV: 9.94762
ICB: -0.00414214
LCS: 5.3497
12614 CT 11/3: 0.0822319
12615 HA 11/3: 0.0846536
12622 CT 11/3: 0.556282
12664 HA 11/5: 0.0164157
12665 HA 11/5: 0.107332
12666 HA 11/5: 1.8134
12667 HA 11/5: 0.0704119
12671 HA 11/5: 0.0434675
12546 HA 11/8: 0.0446634
12547 HA 11/8: 0.451744
CCV: 5.30725
CCB: -0.00327022
Baseline: 0.000932241
12548 HA 11/8: 0.092367
12549 HA 11/8: 0.023823
12550 HA 11/8: 0.0327094
12551 HA 11/8: 0.015747
12552 HA 11/8: 0.00158845
12548 CT 11/8: 1.9634
12550 CT 11/8: 0.216972
12551 CT 11/8: 0.0404353
12552 CT 11/8: 0.69591
12592 CT 11/8: 0.0234028
CCV: 5.30025
CCB: -0.043065
Baseline: 0.000932244
12593 CT 11/8: 0.0931725
12609 CT 11/8: 2.3618
12589 HA 11/9: 0.0385132
12590 HA 11/9: -0.0127938
12592 HA 11/9: -0.0198435
12593 HA 11/9: -0.0394685
12609 HA 11/9: 0.913243
12610 HA 11/9: -0.0316129
12611 CT 11/9: 0.000206164
12612 CT 11/9: -0.0184803

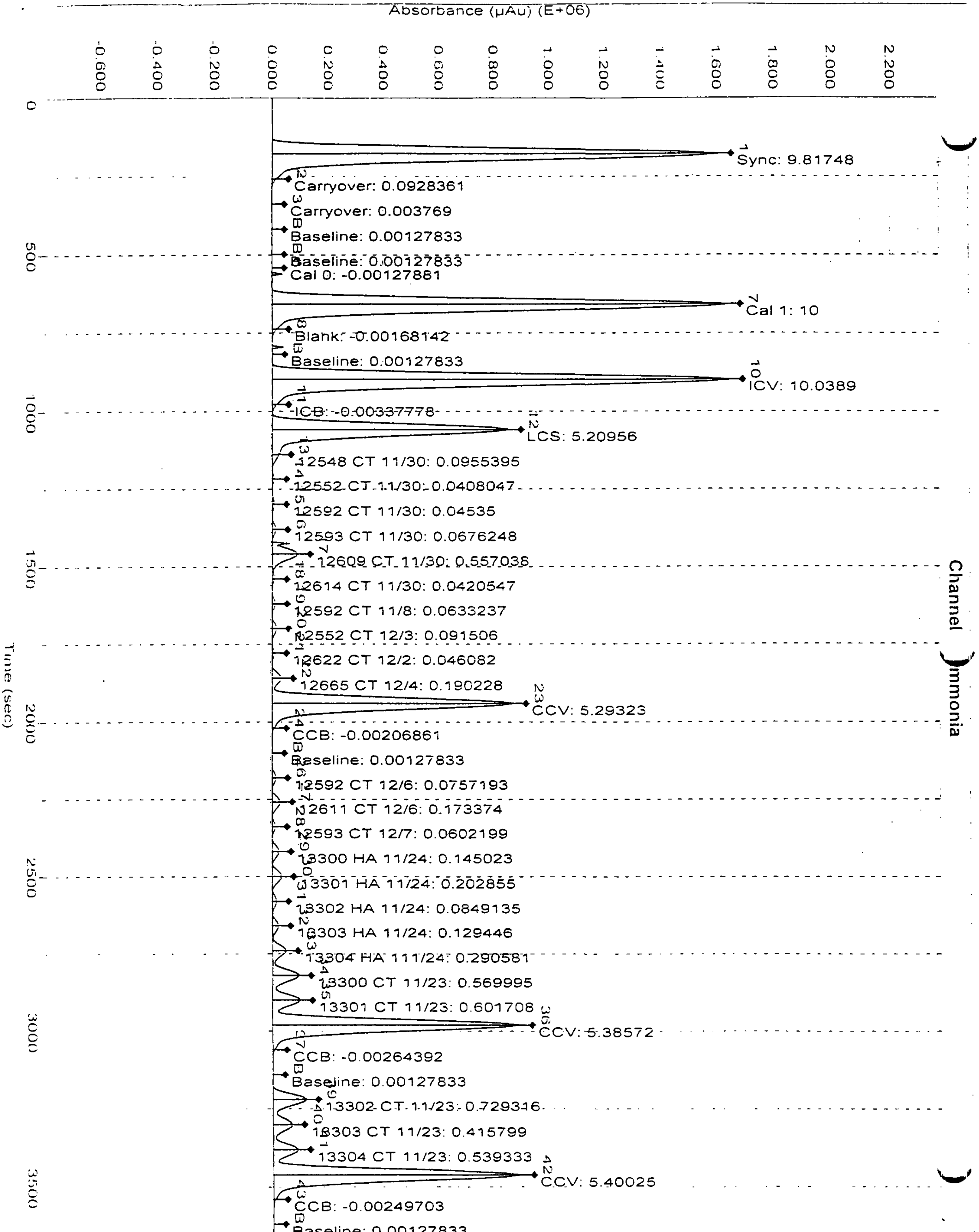
000134

Peak Table: ammonia

File name: F:\FLOW_4\112399B.RST
Date: Unknown
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1080420	10.019993
2	0	Carryover	CO	1	1	4745	0.044935
3	0	Carryover	CO	1	1	813	0.008472
B	0	Baseline	RB	1	1	0	0.000932
B	0	Baseline	RB	1	1	0	0.000932
6	1	Cal 0	C	1	1	-201	-0.000933
7	2	Cal 1	C	1	1	1078264	10.000000
8	0	Blank	U	1	1	-541	-0.004085
B	0	Baseline	RB	1	1	0	0.000932
10	2	ICV	U	1	1	1072615	9.947621
11	1	ICB	U	1	1	-547	-0.004142
12	3	LCS	U	1	1	576792	5.349701
13	91	12614 CT 11/3	U	1	1	8767	0.082232
14	92	12615 HA 11/3	U	1	1	9028	0.084654
15	93	12622 CT 11/3	U	1	1	59887	0.556282
16	94	12664 HA 11/5	U	1	1	1670	0.016416
17	95	12665 HA 11/5	U	1	1	11474	0.107332
18	96	12666 HA 11/5	U	1	1	195450	1.813402
19	97	12667 HA 11/5	U	1	1	7492	0.070412
20	98	12671 HA 11/5	U	1	1	4587	0.043467
21	99	12546 HA 11/8	U	1	1	4716	0.044663
22	100	12547 HA 11/8	U	1	1	48614	0.451744
23	3	CCV	U	1	1	572214	5.307250
	1	CCB	U	1	1	-453	-0.003270
	0	Baseline	RB	1	1	0	0.000932
26	101	12548 HA 11/8	U	1	1	9860	0.092367
27	102	12549 HA 11/8	U	1	1	2468	0.023823
28	103	12550 HA 11/8	U	1	1	3427	0.032709
29	104	12551 HA 11/8	U	1	1	1598	0.015747
30	105	12552 HA 11/8	U	1	1	71	0.001588
31	106	12548 CT 11/8	U	1	1	211625	1.963397
32	107	12550 CT 11/8	U	1	1	23297	0.216972
33	108	12551 CT 11/8	U	1	1	4260	0.040435
34	109	12552 CT 11/8	U	1	1	74944	0.695910
35	110	12592 CT 11/8	U	1	1	2423	0.023403
36	3	CCV	U	1	1	571459	5.300246
37	1	CCB	U	1	1	-4745	-0.043065
B	0	Baseline	RB	1	1	0	0.000932
39	111	12593 CT 11/8	U	1	1	9947	0.093172
40	112	12609 CT 11/8	U	1	1	254588	2.361800
41	113	12589 HA 11/9	U	1	1	4053	0.038513
42	114	12590 HA 11/9	U	1	1	-1480	-0.012794
43	115	12592 HA 11/9	U	1	1	-2240	-0.019844
44	116	12593 HA 11/9	U	1	1	-4357	-0.039468
45	117	12609 HA 11/9	U	1	1	98380	0.913243
46	118	12610 HA 11/9	U	1	1	-3510	-0.031613
47	119	12611 CT 11/9	U	1	1	-78	0.000206
48	120	12612 CT 11/9	U	1	1	-2093	-0.018480

Peak	Cup	Flags
1	2	


Absorbance (µAu) (E+06)
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
2.200
Time (sec)
0
500
1000
1500
2000
2500
3000
3500
Channel
mmonia
1 Sync: 9.81748
2 Carryover: 0.0928361
3 Carryover: 0.003769
B Baseline: 0.00127833
B Baseline: 0.00127833
Cal 0: -0.00127881
7 Cal 1: 10
8 Blank: -0.00168142
B Baseline: 0.00127833
10 ICV: 10.0389
11 ICB: -0.00337778
12 LCS: 5.20956
13 12548 CT 11/30: 0.0955395
14 12552 CT 11/30: 0.0408047
15 12592 CT 11/30: 0.04535
16 12593 CT 11/30: 0.0676248
17 12609 CT 11/30: 0.557038
18 12614 CT 11/30: 0.0420547
19 12592 CT 11/8: 0.0633237
20 12552 CT 12/3: 0.091506
21 12622 CT 12/2: 0.046082
22 12665 CT 12/4: 0.190228
23 CCV: 5.29323
24 CCB: -0.00206861
B Baseline: 0.00127833
26 12592 CT 12/6: 0.0757193
27 12611 CT 12/6: 0.173374
28 12593 CT 12/7: 0.0602199
29 13300 HA 11/24: 0.145023
30 13301 HA 11/24: 0.202855
31 13302 HA 11/24: 0.0849135
32 13303 HA 11/24: 0.129446
33 13304 HA 111/24: 0.290581
34 13300 CT 11/23: 0.569995
35 13301 CT 11/23: 0.601708
36 CCV: 5.38572
37 CCB: -0.00264392
B Baseline: 0.00127833
39 13302 CT 11/23: 0.729316
40 13303 CT 11/23: 0.415799
41 13304 CT 11/23: 0.539333
42 CCV: 5.40025
43 CCB: -0.00249703
B Baseline: 0.00127833

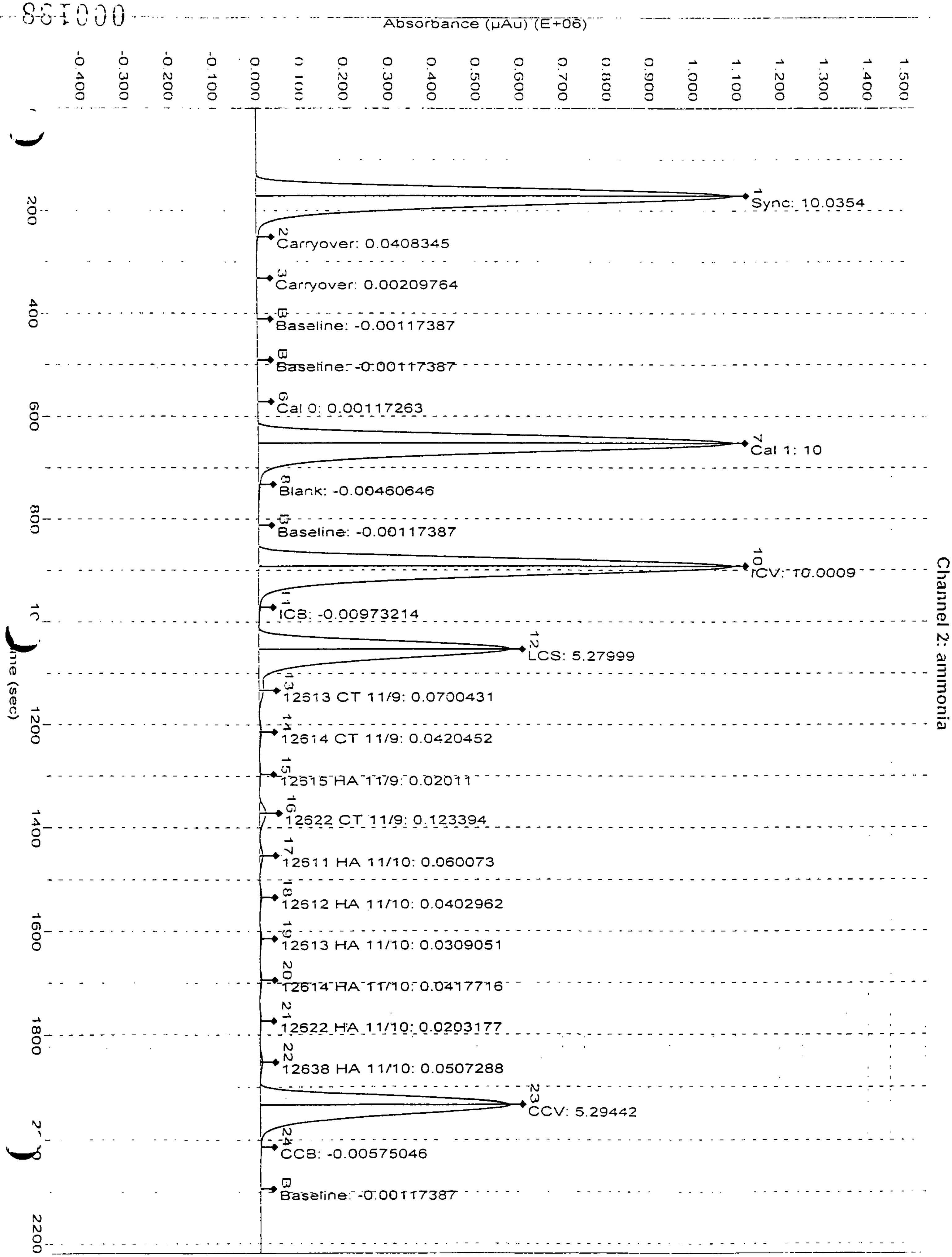
Peak Table: ammonia

File name: E:\FLOW_4\120799C.RST
Date: December 08, 1999
Operator: nvw

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1606045	9.817476
2	0	Carryover	CO	1	1	14980	0.092836
3	0	Carryover	CO	1	1	408	0.003769
B	0	Baseline	RB	1	1	0	0.001278
B	0	Baseline	RB	1	1	0	0.001278
6	1	Cal 0	C	1	1	-418	-0.001279
7	2	Cal 1	C	1	1	1635908	10.000000
8	0	Blank	U	1	1	-484	-0.001681
B	0	Baseline	RB	1	1	0	0.001278
10	2	ICV	U	1	1	1642269	10.038879
11	1	ICB	U	1	1	-762	-0.003378
12	3	LCS	U	1	1	852135	5.209557
13	91	12548 CT 11/30	U	1	1	15422	0.095540
14	92	12552 CT 11/30	U	1	1	6467	0.040805
15	93	12592 CT 11/30	U	1	1	7211	0.045350
16	94	12593 CT 11/30	U	1	1	10855	0.067625
17	95	12609 CT 11/30	U	1	1	90929	0.557038
18	96	12614 CT 11/30	U	1	1	6671	0.042055
19	97	12592 CT 11/8	U	1	1	10151	0.063324
20	98	12552 CT 12/3	U	1	1	14762	0.091506
21	99	12622 CT 12/2	U	1	1	7330	0.046082
22	100	12665 CT 12/4	U	1	1	30914	0.190228
23	3	CCV	U	1	1	865826	5.293231
[illegible]	1	CCB	U	1	1	-548	-0.002069
B	0	Baseline	RB	1	1	0	0.001278
26	101	12592 CT 12/6	U	1	1	12179	0.075719
27	102	12611 CT 12/6	U	1	1	28157	0.173374
28	103	12593 CT 12/7	U	1	1	9644	0.060220
29	104	13300 HA 11/24	U	1	1	23518	0.145023
30	105	13301 HA 11/24	U	1	1	32980	0.202855
31	106	13302 HA 11/24	U	1	1	13684	0.084914
32	107	13303 HA 11/24	U	1	1	20970	0.129446
33	108	13304 HA 111/24	U	1	1	47333	0.290581
34	109	13300 CT 11/23	U	1	1	93049	0.569995
35	110	13301 CT 11/23	U	1	1	98237	0.601708
36	3	CCV	U	1	1	880958	5.385724
37	1	CCB	U	1	1	-642	-0.002644
B	0	Baseline	RB	1	1	0	0.001278
39	111	13302 CT 11/23	U	1	1	119116	0.729316
40	112	13303 CT 11/23	U	1	1	67820	0.415799
41	113	13304 CT 11/23	U	1	1	88032	0.539333
42	3	CCV	U	1	1	883335	5.400253
43	1	CCB	U	1	1	-618	-0.002497
B	0	Baseline	RB	1	1	0	0.001278

Peak	Cup	Flags
[illegible]	2	
2	0	
3	0	
B	0	BL
B	0	BL

000198



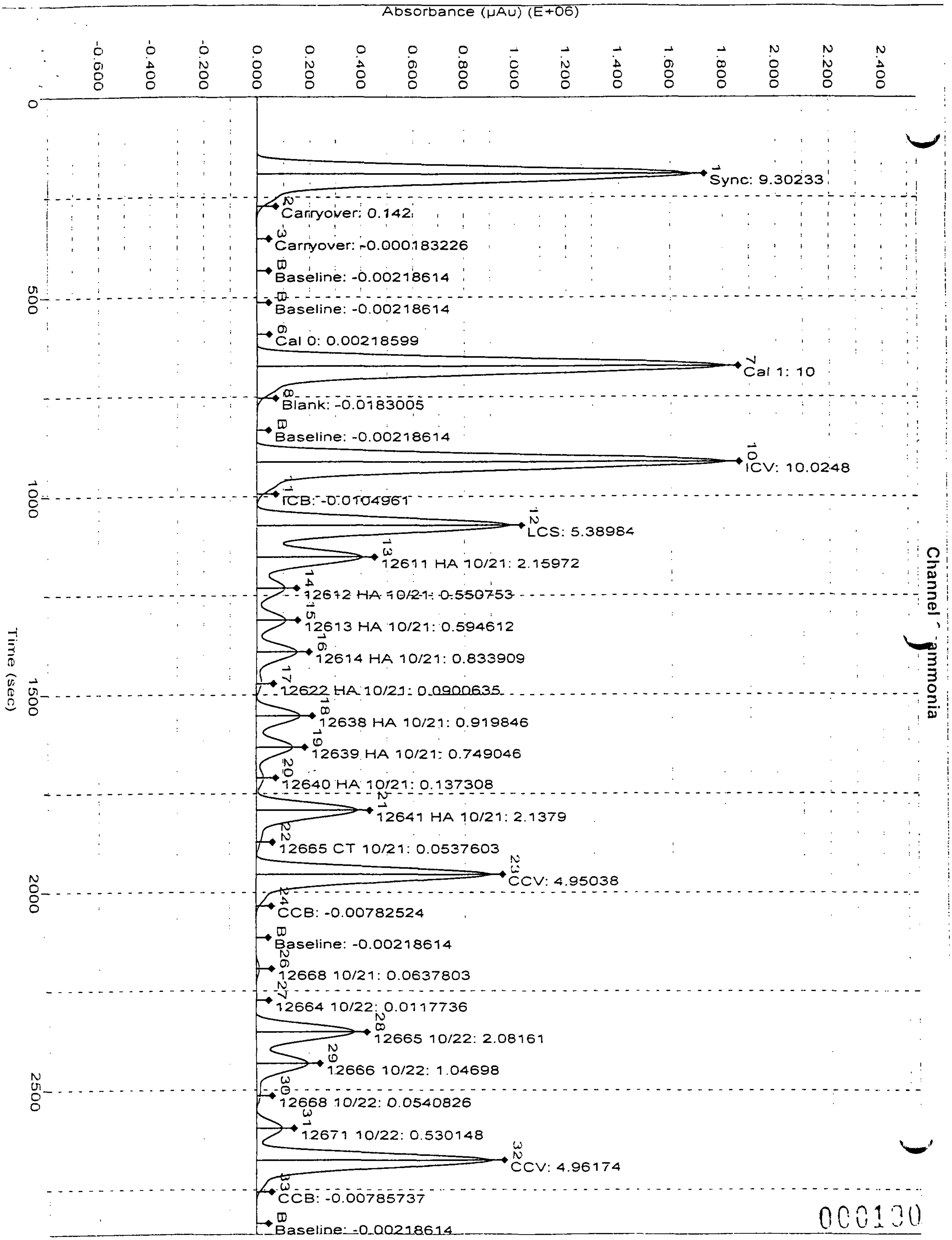
Absorbance (µAu) (E+06)
-0.400
-0.300
-0.200
-0.100
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500
Time (sec)
200
400
600
800
1200
1400
1600
1800
2200
Channel 2: ammonia
1 Sync: 10.0354
2 Carryover: 0.0408345
3 Carryover: 0.00209764
B Baseline: -0.00117387
B Baseline: -0.00117387
6 Cal 0: 0.00117263
7 Cal 1: 10
8 Blank: -0.00460646
B Baseline: -0.00117387
10 ICV: 10.0009
11 ICB: -0.00973214
12 LCS: 5.27999
13 12613 CT 11/9: 0.0700431
14 12614 CT 11/9: 0.0420452
15 12615 HA 11/9: 0.02011
16 12622 CT 11/9: 0.123394
17 12611 HA 11/10: 0.060073
18 12612 HA 11/10: 0.0402962
19 12613 HA 11/10: 0.0309051
20 12614 HA 11/10: 0.0417716
21 12622 HA 11/10: 0.0203177
22 12638 HA 11/10: 0.0507288
23 CCV: 5.29442
24 CCB: -0.00575046
B Baseline: -0.00117387

Peak Table: ammonia

File name: F:\FLOW_4\112399B1.RST
Date: November 23, 1999
Operator: NVW

[illegible]k	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1092316 -	10.035433
2	0	Carryover	CO	1	1	4572	0.040835
3	0	Carryover	CO	1	1	356	0.002098
B	0	Baseline	RB	1	1	0	-0.001174
B	0	Baseline	RB	1	1	0	-0.001174
6	1	Cal 0	C	1	1	255	0.001173
7	2	Cal 1	C	1	1	1088460	10.000001
8	0	Blank	U	1	1	-374	-0.004606
B	0	Baseline	RB	1	1	0	-0.001174
10	2	ICV	U	1	1	1088557	10.000895
11	1	ICB	U	1	1	-931	-0.009732
12	3	LCS	U	1	1	574766	5.279994
13	10	12613 CT 11/9	U	1	1	7751	0.070043
14	11	12614 CT 11/9	U	1	1	4704	0.042045
15	12	12615 HA 11/9	U	1	1	2316	0.020110
16	13	12622 CT 11/9	U	1	1	13557	0.123394
17	14	12611 HA 11/10	U	1	1	6666	0.060073
18	15	12612 HA 11/10	U	1	1	4513	0.040296
19	16	12613 HA 11/10	U	1	1	3491	0.030905
20	17	12614 HA 11/10	U	1	1	4674	0.041772
21	18	12622 HA 11/10	U	1	1	2339	0.020318
22	19	12638 HA 11/10	U	1	1	5649	0.050729
23	3	CCV	U	1	1	576336	5.294418
	1	CCB	U	1	1	-498	-0.005750
[illegible]	0	Baseline	RB	1	1	0	-0.001174

Peak	Cup	Flags
1	2	
2	0	
3	0	
B	0	BL
B	0	BL
6	1	
7	2	
8	0	LO
B	0	BL
10	2	
11	1	LO
12	3	
13	10	
14	11	
15	12	
16	13	
17	14	
18	15	
19	16	
[illegible]	17	
[illegible]	18	
22	19	
23	3	
24	1	LO



Absorbance (µAu) (E+06)
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Time (sec)
0
500
1000
1500
2000
2500
Channel ammonia
1 Sync: 9.30233
2 Carryover: 0.142
3 Carryover: -0.000183226
B Baseline: -0.00218614
B Baseline: -0.00218614
6 Cal 0: 0.00218599
7 Cal 1: 10
8 Blank: -0.0183005
B Baseline: -0.00218614
10 ICV: 10.0248
11 ICB: -0.0104961
12 LCS: 5.38984
13 12611 HA 10/21: 2.15972
14 12612 HA 10/21: 0.550753
15 12613 HA 10/21: 0.594612
16 12614 HA 10/21: 0.833909
17 12622 HA 10/21: 0.0900635
18 12638 HA 10/21: 0.919846
19 12639 HA 10/21: 0.749046
20 12640 HA 10/21: 0.137308
21 12641 HA 10/21: 2.1379
22 12665 CT 10/21: 0.0537603
23 CCV: 4.95038
24 CCB: -0.00782524
B Baseline: -0.00218614
26 12668 10/21: 0.0637803
27 12664 10/22: 0.0117736
28 12665 10/22: 2.08161
29 12666 10/22: 1.04698
30 12668 10/22: 0.0540826
31 12671 10/22: 0.530148
32 CCV: 4.96174
33 CCB: -0.00785737
B Baseline: -0.00218614

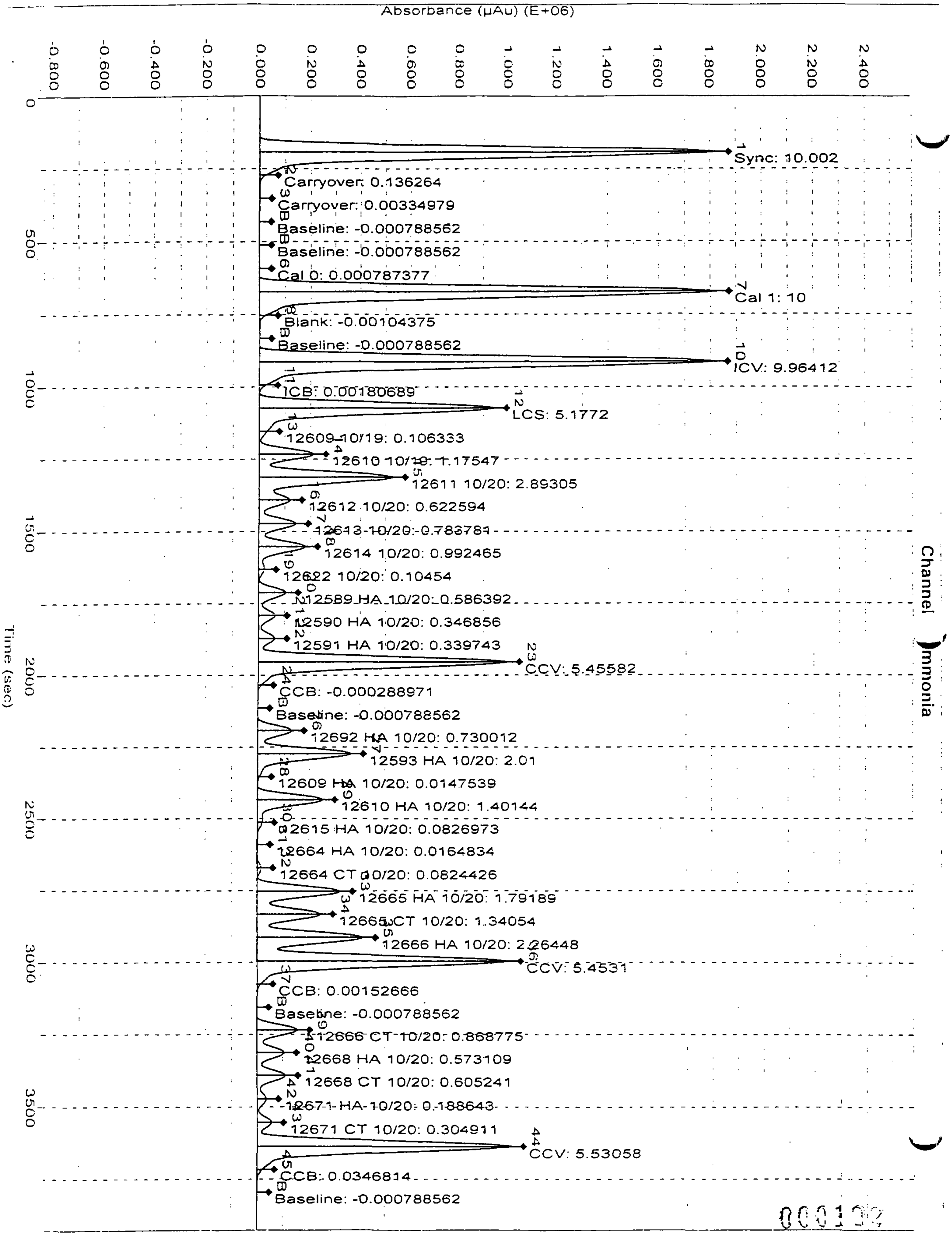
000130

Peak Table: ammonia

File name: F:\FLOW_4\102799F.RST
Date: October 28, 1999
Operator: NVW

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1683774	9.302330
2	0	Carryover	CO	1	1	26092	0.142000
3	0	Carryover	CO	1	1	362	-0.000183
B	0	Baseline	RB	1	1	0	-0.002186
B	0	Baseline	RB	1	1	0	-0.002186
6	1	Cal 0	C	1	1	791	0.002186
7	2	Cal 1	C	1	1	1810026	10.000000
8	0	Blank	U	1	1	-2916	-0.018301
B	0	Baseline	RB	1	1	0	-0.002186
10	2	ICV	U	1	1	1814510	10.024775
11	1	ICB	U	1	1	-1504	-0.010496
12	3	LCS	U	1	1	975757	5.389835
13	91	12611 HA 10/21	U	1	1	391225	2.159720
14	92	12612 HA 10/21	U	1	1	100062	0.550753
15	93	12613 HA 10/21	U	1	1	107998	0.594612
16	94	12614 HA 10/21	U	1	1	151302	0.833909
17	95	12622 HA 10/21	U	1	1	16694	0.090064
18	96	12638 HA 10/21	U	1	1	166854	0.919846
19	97	12639 HA 10/21	U	1	1	135945	0.749046
20	98	12640 HA 10/21	U	1	1	25243	0.137308
21	99	12641 HA 10/21	U	1	1	387277	2.137903
22	100	12665 CT 10/21	U	1	1	10124	0.053760
23	3	CCV	U	1	1	896232	4.950380
[illegible]	1	CCB	U	1	1	-1020	-0.007825
B	0	Baseline	RB	1	1	0	-0.002186
26	101	12668 10/21	U	1	1	11937	0.063780
27	102	12664 10/22	U	1	1	2526	0.011774
28	103	12665 10/22	U	1	1	377090	2.081606
29	104	12666 10/22	U	1	1	189860	1.046979
30	105	12668 10/22	U	1	1	10183	0.054083
31	106	12671 10/22	U	1	1	96333	0.530148
32	3	CCV	U	1	1	898288	4.961744
33	1	CCB	U	1	1	-1026	-0.007857
B	0	Baseline	RB	1	1	0	-0.002186

Peak	Cup	Flags
1	2	
2	0	
3	0	LO
B	0	BL
B	0	BL
6	1	
7	2	
8	0	LO
B	0	BL
10	2	
11	1	LO
12	3	
13	91	
14	92	
15	93	



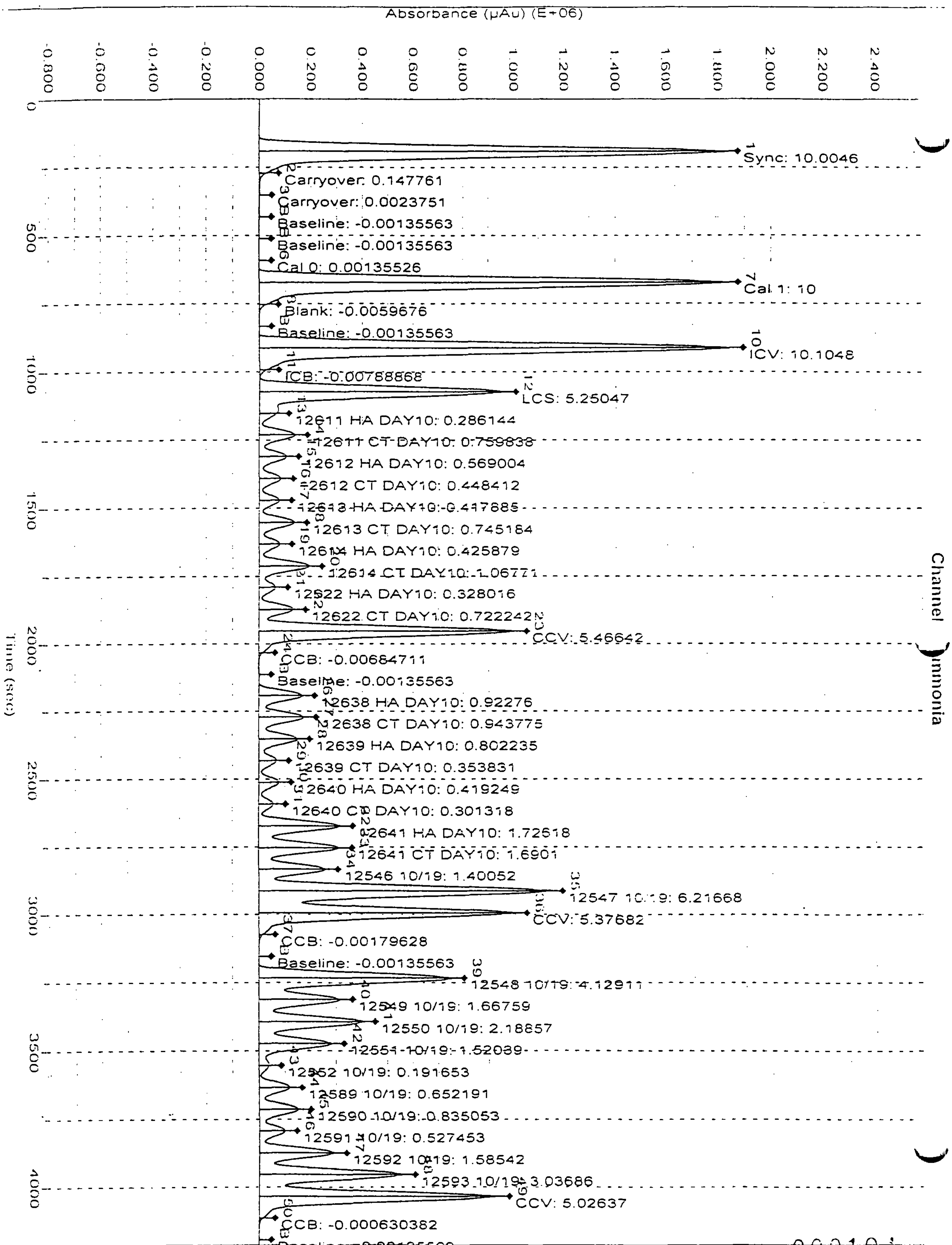
Absorbance (µAu) (E+06)
-0.800
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Time (sec)
0
500
1000
1500
2000
2500
3000
3500
Channel
Ammonia
1 Sync: 10.002
2 Carryover: 0.136264
3 Carryover: 0.00334979
B Baseline: -0.000788562
B Baseline: -0.000788562
6 Cal 0: 0.000787377
7 Cal 1: 10
8 Blank: -0.00104375
B Baseline: -0.000788562
10 ICV: 9.96412
11 ICB: 0.00180689
12 LCS: 5.1772
13 12609 10/19: 0.106333
14 12610 10/19: 1.17547
15 12611 10/20: 2.89305
16 12612 10/20: 0.622594
17 12613 10/20: 0.783781
18 12614 10/20: 0.992465
19 12622 10/20: 0.10454
20 12589 HA 10/20: 0.586392
21 12590 HA 10/20: 0.346856
22 12591 HA 10/20: 0.339743
23 CCV: 5.45582
24 CCB: -0.000288971
B Baseline: -0.000788562
26 12692 HA 10/20: 0.730012
27 12593 HA 10/20: 2.01
28 12609 HA 10/20: 0.0147539
29 12610 HA 10/20: 1.40144
30 12615 HA 10/20: 0.0826973
31 12664 HA 10/20: 0.0164834
32 12664 CT 10/20: 0.0824426
33 12665 HA 10/20: 1.79189
34 12665 CT 10/20: 1.34054
35 12666 HA 10/20: 2.26448
36 CCV: 5.4531
37 CCB: 0.00152666
B Baseline: -0.000788562
39 12666 CT 10/20: 0.868775
40 12668 HA 10/20: 0.573109
41 12668 CT 10/20: 0.605241
42 12671 HA 10/20: 0.188643
43 12671 CT 10/20: 0.304911
44 CCV: 5.53058
45 CCB: 0.0346814
B Baseline: -0.000788562

Peak Table: ammonia

File name: E:\FLOW_4\102799E.RST
Date: October 28, 1999
Operator: LKS

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1827617	10.001991
2	0	Carryover	CO	1	1	25041	0.136264
3	0	Carryover	CO	1	1	756	0.003350
B	0	Baseline	RB	1	1	0	-0.000789
B	0	Baseline	RB	1	1	0	-0.000789
6	1	Cal 0	C	1	1	288	0.000787
7	2	Cal 1	C	1	1	1827253	10.000001
8	0	Blank	U	1	1	-47	-0.001044
B	0	Baseline	RB	1	1	0	-0.000789
10	2	ICV	U	1	1	1820698	9.964125
11	1	ICB	U	1	1	474	0.001807
12	3	LCS	U	1	1	946075	5.177200
13	61	12609 10/19	U	1	1	19572	0.106333
14	62	12610 10/19	U	1	1	214916	1.175473
15	63	12611 10/20	U	1	1	528736	2.893049
16	64	12612 10/20	U	1	1	113899	0.622594
17	65	12613 10/20	U	1	1	143349	0.783781
18	66	12614 10/20	U	1	1	181478	0.992465
19	67	12622 10/20	U	1	1	19245	0.104540
20	68	12589 HA 10/20	U	1	1	107284	0.586392
21	69	12590 HA 10/20	U	1	1	63518	0.346856
22	70	12591 HA 10/20	U	1	1	62219	0.339743
23	3	CCV	U	1	1	996983	5.455823
[illegible]	1	CCB	U	1	1	91	-0.000289
B	0	Baseline	RB	1	1	0	-0.000789
26	71	12692 HA 10/20	U	1	1	133525	0.730012
27	72	12593 HA 10/20	U	1	1	367392	2.009997
28	73	12609 HA 10/20	U	1	1	2840	0.014754
29	74	12610 HA 10/20	U	1	1	256203	1.401440
30	75	12615 HA 10/20	U	1	1	15254	0.082697
31	76	12664 HA 10/20	U	1	1	3156	0.016483
32	77	12664 CT 10/20	U	1	1	15207	0.082443
33	78	12665 HA 10/20	U	1	1	327542	1.791890
34	79	12665 CT 10/20	U	1	1	245075	1.340539
35	80	12666 HA 10/20	U	1	1	413889	2.264477
36	3	CCV	U	1	1	996484	5.453096
37	1	CCB	U	1	1	423	0.001527
B	0	Baseline	RB	1	1	0	-0.000789
39	81	12666 CT 10/20	U	1	1	158879	0.868775
40	82	12668 HA 10/20	U	1	1	104857	0.573109
41	83	12668 CT 10/20	U	1	1	110728	0.605241
42	84	12671 HA 10/20	U	1	1	34611	0.188643
43	85	12671 CT 10/20	U	1	1	55855	0.304911
44	3	CCV	U	1	1	1010641	5.530580
45	1	CCB	U	1	1	6481	0.034681
B	0	Baseline	RB	1	1	0	-0.000789

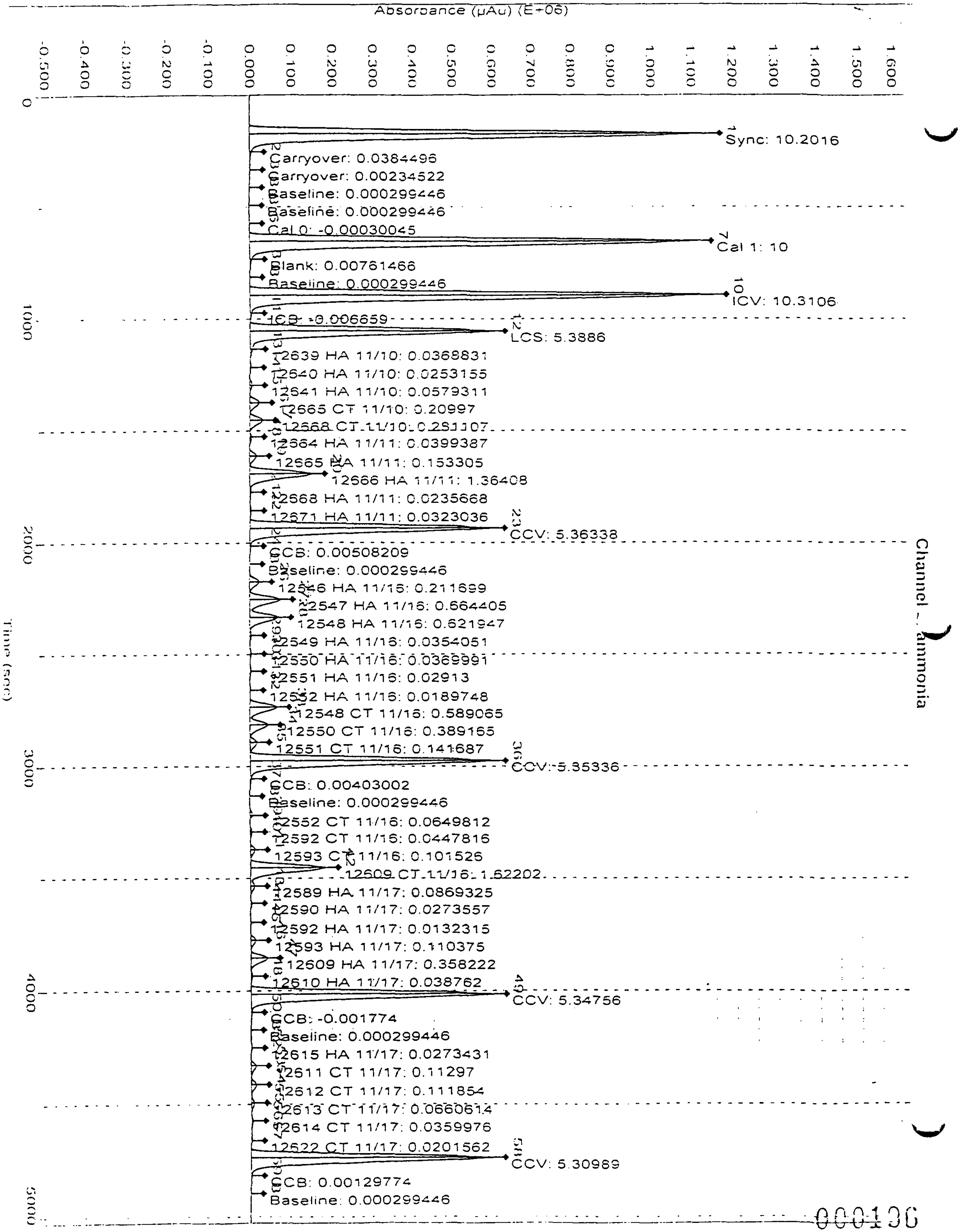
Peak	Cup	Flags
1	2	
2	0	
3	0	


Absorbance (µAu) (E+06)
-0.800
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Time (sec)
0
500
1000
1500
2000
2500
3000
3500
4000
Sync: 10.0046
Carryover: 0.147761
Carryover: 0.0023751
Baseline: -0.00135563
Baseline: -0.00135563
Cal 0: 0.00135526
Cal 1: 10
Blank: -0.0059676
Baseline: -0.00135563
ICV: 10.1048
ICB: -0.00768868
LCS: 5.25047
12611 HA DAY10: 0.286144
12611 CT DAY10: 0.759838
12612 HA DAY10: 0.569004
12612 CT DAY10: 0.448412
12613 HA DAY10: 0.417685
12613 CT DAY10: 0.745184
12614 HA DAY10: 0.425879
12614 CT DAY10: 1.06771
12622 HA DAY10: 0.328016
12622 CT DAY10: 0.722242
CCV: 5.46642
CCB: -0.00684711
Baseline: -0.00135563
12638 HA DAY10: 0.92276
12638 CT DAY10: 0.943775
12639 HA DAY10: 0.802235
12639 CT DAY10: 0.353831
12640 HA DAY10: 0.419249
12640 CT DAY10: 0.301318
12641 HA DAY10: 1.72618
12641 CT DAY10: 1.6901
12546 10/19: 1.40052
12547 10/19: 6.21668
CCV: 5.37682
CCB: -0.00179628
Baseline: -0.00135563
12548 10/19: 4.12911
12549 10/19: 1.66759
12550 10/19: 2.18857
12551 10/19: 1.52039
12552 10/19: 0.191653
12589 10/19: 0.652191
12590 10/19: 0.835053
12591 10/19: 0.527453
12592 10/19: 1.58542
12593 10/19: 3.03686
CCV: 5.02637
CCB: -0.000630382
Baseline: -0.00135563
Channel
Ammonia

Peak Table: ammonia

File name: F:\FLOW_4\102799D.RST
Date: October ~~28~~, 1999
Operator: LKS 27 J

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1828142	10.004595
2	0	Carryover	CO	1	1	27244	0.147761
3	0	Carryover	CO	1	1	682	0.002375
B	0	Baseline	RB	1	1	0	-0.001356
B	0	Baseline	RB	1	1	0	-0.001356
6	1	Cal 0	C	1	1	495	0.001355
7	2	Cal 1	C	1	1	1827302	10.000000
8	0	Blank	U	1	1	-843	-0.005968
B	0	Baseline	RB	1	1	0	-0.001356
10	2	ICV	U	1	1	1846458	10.104847
11	1	ICB	U	1	1	-1194	-0.007889
12	3	LCS	U	1	1	959538	5.250472
13	31	12611 HA DAY10	U	1	1	52528	0.286144
14	32	12611 CT DAY10	U	1	1	139074	0.759838
15	33	12612 HA DAY10	U	1	1	104208	0.569004
16	34	12612 CT DAY10	U	1	1	82175	0.448412
17	35	12613 HA DAY10	U	1	1	76598	0.417885
18	36	12613 CT DAY10	U	1	1	136397	0.745184
19	37	12614 HA DAY10	U	1	1	78058	0.425879
20	38	12614 CT DAY10	U	1	1	195324	1.067707
21	39	12622 HA DAY10	U	1	1	60178	0.328016
22	40	12622 CT DAY10	U	1	1	132205	0.722242
23	3	CCV	U	1	1	998992	5.466417
[illegible]	1	CCB	U	1	1	-1003	-0.006847
B	0	Baseline	RB	1	1	0	-0.001356
26	41	12638 HA DAY10	U	1	1	168841	0.922760
27	42	12638 CT DAY10	U	1	1	172681	0.943775
28	43	12639 HA DAY10	U	1	1	146820	0.802235
29	44	12639 CT DAY10	U	1	1	64895	0.353831
30	45	12640 HA DAY10	U	1	1	76847	0.419249
31	46	12640 CT DAY10	U	1	1	55300	0.301318
32	47	12641 HA DAY10	U	1	1	315631	1.726184
33	48	12641 CT DAY10	U	1	1	309039	1.690103
34	49	12546 10/19	U	1	1	256130	1.400515
35	50	12547 10/19	U	1	1	1136070	6.216682
36	3	CCV	U	1	1	982623	5.376822
37	1	CCB	U	1	1	-81	-0.001796
B	0	Baseline	RB	1	1	0	-0.001356
39	51	12548 10/19	U	1	1	754658	4.129107
40	52	12549 10/19	U	1	1	304925	1.667588
41	53	12550 10/19	U	1	1	400111	2.188566
42	54	12551 10/19	U	1	1	278030	1.520385
43	55	12552 10/19	U	1	1	35264	0.191653
44	56	12589 10/19	U	1	1	119406	0.652191
45	57	12590 10/19	U	1	1	152816	0.835053
46	58	12591 10/19	U	1	1	96616	0.527453
47	59	12592 10/19	U	1	1	289912	1.585416
48	60	12593 10/19	U	1	1	555099	3.036863
[illegible]	3	CCV	U	1	1	918593	5.026368
[illegible]	1	CCB	U	1	1	133	-0.000630
B	0	Baseline	RB	1	1	0	-0.001356


Absorbance (µAu) (E+06)
-0.500
-0.400
-0.300
-0.200
-0.100
0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500
1.600
Time (sec)
0
1000
2000
3000
4000
5000
Sync: 10.2016
Carryover: 0.0384496
Carryover: 0.00234522
Baseline: 0.000299446
Baseline: 0.000299446
Cal 0: -0.00030045
Cal 1: 10
Blank: 0.00761466
Baseline: 0.000299446
ICV: 10.3106
ICB: -0.006659
LCS: 5.3886
12639 HA 11/10: 0.0368831
12640 HA 11/10: 0.0253155
12641 HA 11/10: 0.0579311
12665 CT 11/10: 0.20997
12668 CT 11/10: 0.281107
12664 HA 11/11: 0.0399387
12665 HA 11/11: 0.153305
12666 HA 11/11: 1.36408
12668 HA 11/11: 0.0235668
12671 HA 11/11: 0.0323036
CCV: 5.36338
CCB: 0.00508209
Baseline: 0.000299446
12546 HA 11/16: 0.211699
12547 HA 11/16: 0.664405
12548 HA 11/16: 0.621947
12549 HA 11/16: 0.0354051
12550 HA 11/16: 0.0369991
12551 HA 11/16: 0.02913
12552 HA 11/16: 0.0189748
12548 CT 11/16: 0.589065
12550 CT 11/16: 0.389165
12551 CT 11/16: 0.141687
CCV: 5.35336
CCB: 0.00403002
Baseline: 0.000299446
12552 CT 11/16: 0.0649812
12592 CT 11/16: 0.0447816
12593 CT 11/16: 0.101526
12609 CT 11/16: 1.62202
12589 HA 11/17: 0.0869325
12590 HA 11/17: 0.0273557
12592 HA 11/17: 0.0132315
12593 HA 11/17: 0.110375
12609 HA 11/17: 0.358222
12610 HA 11/17: 0.038762
CCV: 5.34756
CCB: -0.001774
Baseline: 0.000299446
12615 HA 11/17: 0.0273431
12611 CT 11/17: 0.11297
12612 CT 11/17: 0.111854
12613 CT 11/17: 0.0660614
12614 CT 11/17: 0.0359976
12622 CT 11/17: 0.0201562
CCV: 5.30989
CCB: 0.00129774
Baseline: 0.000299446
Channel ... ammonia

000106

Peak Table: ammonia

File name: F:\FLOW_4\112399C.RST
Date: November 23, 1999
Operator: nvw

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
1	2	Sync	SYNC	1	1	1139012	10.201578
2	0	Carryover	CO	1	1	4260	0.038450
3	0	Carryover	CO	1	1	228	0.002345
B	0	Baseline	RB	1	1	0	0.000299
B	0	Baseline	RB	1	1	0	0.000299
6	1	Cal 0	C	1	1	-67	-0.000300
7	2	Cal 1	C	1	1	1116505	10.000001
8	0	Blank	U	1	1	817	0.007615
B	0	Baseline	RB	1	1	0	0.000299
10	2	ICV	U	1	1	1151190	10.310650
11	1	ICB	U	1	1	-777	-0.006659
12	3	LCS	U	1	1	601625	5.388603
13	31	12639 HA 11/10	U	1	1	4085	0.036883
14	32	12640 HA 11/10	U	1	1	2793	0.025316
15	33	12641 HA 11/10	U	1	1	6435	0.057931
16	34	12665 CT 11/10	U	1	1	23411	0.209970
17	35	12668 CT 11/10	U	1	1	31353	0.281107
18	36	12664 HA 11/11	U	1	1	4426	0.039939
19	37	12665 HA 11/11	U	1	1	17084	0.153305
20	38	12666 HA 11/11	U	1	1	152272	1.364084
21	39	12668 HA 11/11	U	1	1	2598	0.023567
22	40	12671 HA 11/11	U	1	1	3573	0.032304
23	3	CCV	U	1	1	598809	5.363383
[illegible]	1	CCB	U	1	1	534	0.005082
[illegible]	0	Baseline	RB	1	1	0	0.000299
26	41	12546 HA 11/16	U	1	1	23604	0.211699
27	42	12547 HA 11/16	U	1	1	74150	0.664405
28	43	12548 HA 11/16	U	1	1	69409	0.621947
29	44	12549 HA 11/16	U	1	1	3920	0.035405
30	45	12550 HA 11/16	U	1	1	4098	0.036999
31	46	12551 HA 11/16	U	1	1	3219	0.029130
32	47	12552 HA 11/16	U	1	1	2085	0.018975
33	48	12548 CT 11/16	U	1	1	65738	0.589065
34	49	12550 CT 11/16	U	1	1	43418	0.389165
35	50	12551 CT 11/16	U	1	1	15786	0.141687
36	3	CCV	U	1	1	597690	5.353364
37	1	CCB	U	1	1	417	0.004030
B	0	Baseline	RB	1	1	0	0.000299
39	51	12552 CT 11/16	U	1	1	7222	0.064981
40	52	12592 CT 11/16	U	1	1	4967	0.044782
41	53	12593 CT 11/16	U	1	1	11302	0.101526
42	54	12609 CT 11/16	U	1	1	181072	1.622023
43	55	12589 HA 11/17	U	1	1	9673	0.086932
44	56	12590 HA 11/17	U	1	1	3021	0.027356
45	57	12592 HA 11/17	U	1	1	1444	0.013232
46	58	12593 HA 11/17	U	1	1	12290	0.110375
47	59	12609 HA 11/17	U	1	1	39963	0.358222
48	60	12610 HA 11/17	U	1	1	4294	0.038762
49	3	CCV	U	1	1	597042	5.347564
[illegible]	1	CCB	U	1	1	-232	-0.001774
B	0	Baseline	RB	1	1	0	0.000299
52	61	12615 HA 11/17	U	1	1	3020	0.027343
53	62	12611 CT 11/17	U	1	1	12580	0.112970
54	63	12612 CT 11/17	U	1	1	12456	0.111854

Peak	Cup	Name	Type	Dil	Wt	Height	Calc. (mg/L)
55	64	12613 CT 11/17	U	1	1	7343	0.066061
56	65	12614 CT 11/17	U	1	1	3986	0.035998
57	66	12622 CT 11/17	U	1	1	2217	0.020156
58	3	CCV	U	1	1	592836	5.309892
59	1	CCB	U	1	1	111	0.001298
B	0	Baseline	RB	1	1	0	0.000299

Peak	Cup	Flags
1	2	
2	0	
3	0	
B	0	BL
B	0	BL
6	1	LO
7	2	
8	0	
B	0	BL
10	2	
11	1	LO
12	3	
13	31	
14	32	
15	33	
16	34	
17	35	
18	36	
19	37	
20	38	
21	39	
22	40	
23	3	
24	1	
B	0	BL
26	41	
27	42	
28	43	
29	44	
30	45	
31	46	
32	47	
33	48	
34	49	
35	50	
36	3	
37	1	
B	0	BL
39	51	
40	52	
41	53	
42	54	
43	55	
44	56	
45	57	
46	58	
47	59	
48	60	

AMMONIA ANALYSIS

Client: Menzie-Cura Ct. chronic BTR Number: Several

Sample Date	Sample Description	10N NaOH (ml)	50 ml Sample (ml)	Meter Reading NH_3-N (ppm)
	Calibration:			
	1 ppm	✓	✓	1.55
	5 ppm	✓	✓	5.52
	2 ppm EXT. STD.	✓	✓	1.92
	~~0.5 ppm~~			
	Blank (DI)	✓	✓	<0.5
11/29	12550 [BTOX-D-2]	✓	✓	<0.5
11/29	12551 [BTOX-D-3]	✓	✓	<0.5
11/29	12612 [BP-1 Borrow Pit	✓	✓	<0.5
11/29	12613 [BP-1 Borrow Pit (DUPE)]	✓	✓	<0.5
	~~1~~ ~~0.5~~ STD. check (0.5) JG	✓	✓	0.491
11/29	12668 [LABQC-LCS]	✓	✓	<0.5
12/9	12548 [BTOX-C-3]	✓	✓	<0.5
12/13	12609 [E-1 Dead Creek]	✓	✓	<0.5
	0.5 STD. check	✓	✓	0.490
	Blank (DI)	✓	✓	<0.5

SLOPE = -58.4

Analyst: JG Analysis Date: 12/22/99

Reviewed by: [signature] Date: 12/22/99

ammonia.lwp

10/12/99

#	ABS Sample ID		NVW <0.5	JWW <0.5
1.	1~~0~~589 (2 Res)	Ø	Y	Y
2.	590	Ø		
3.	591	Ø		
4.	592	Ø		
5.	593	Ø		
6.	10609	Ø		
7.	10610	Ø		
8.	1~~0~~615	Ø		
9.	12611	Ø		
10.	612	Ø		
11.	613	Ø		
12.	614	Ø		
13	12622	Ø		
14	12638	Ø		
15.	12639	Ø		
16.	12640	Ø		
17.	12641	Ø		
18	12546 PW			
19.	547 PW			
20.	548 PW			

NVW 10/12/99

JWW 10/12/99

II	ABS Sample ID		NVW < 0.5 ppm	JWW < 0.5
1	12664	PW	Y	Y
2	RHB 65	PW		
3	12671	PW		
4	10546	0		
5	10547	0		
6	10548	0		
7	10549	0		
8	550	0		
9	10551	0		
10	552	0		
11	12664	0		
12	665	0		
13	666	0		
14	668	0		
15	671	0	V	V

NVW
10/12/99

10/12/99

	NVW	JWW
	<0.5 ppms =	<0.5 ppms =
1. 12549 PW		
2. 550 PW		
3. RdF 12 551 PW		
4. 10 589 PW		
5. 590 PW		
6. 591 PW		
7. 592 PW		
8. 593 PW		
9. 10609 PW		
10. 12610 PW		
11. 611 PW		
12. 612 PW		
13. 613 PW		
14. 614 PW		
15. 12638 PW		
16. 639 PW		
17. 640 PW		
18. 641 PW		
19. 12666 PW		
20.* 12666 PW	N	N

NVW 10/12/99

JWW 10/12/99

* 5.0 ppm MS

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3615

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/6/99 ✓ & 10/18/99; ALL SAMPLES (retest) JG ~~for LS~~ TM
- *C. tentans* acute test: 10/6/99 ✓
- *H. azteca* chronic test: 10/18/99; ALL SAMPLES JG for LS
- *C. tentans* chronic test: 12548, 12550, 12551; 10/18/99 JG for LS

10/28/99 – Loaded sediments for ax moles (12548, 12550, 12551, 12552, 12592, 12593, 12609) JW

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12546	6.9			Viscous mud, no overlying water
12547	7.0			Liquid, fine mud, many freshwater gastropods, removed visible gastropods 10/6 T.
12548	7.0			Liquid mud, gastropods present, removed those visible 10/6 TM
12549	7.0			Soft mud, pine needles, some overlying water
12550	7.0			Soft mud with overlying water pine needles
12551	7.0			Soft mud with overlying water
12552 LCS	TM 10/6/99			EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: TM Date: 10/6/99

Reviewer: [signature] Date: 2/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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000303

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3622 / 3629

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/7/99 & 10/18/99 JG TM (Hyalella retest)
- *C. tentans* acute test: 10/7/99
- *H. azteca* chronic test:
- *C. tentans* chronic test: 10/18/99 ; 12592, 12593, 12609 TM

*Sample 12592 sieved to remove indigenous chironimids. (for C.t. only).

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12589	7.1			dk brown muddy sediment with sticks and vegetative materia
12590	6.9			dk brown cohesive mud with veg. material
12591	6.9			brown mud with veg. material
* 12592	7.1			dk. brown mud with little veg. materia
12593	7.0			black watery mud w/petrolium-like odor
12609	7.1			thick dk. brown cohesive mud with veg. material
12610	7.2			dk brown, very thick cohesive mud w/some veg material.
12615 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JJG Date: 10/7/99

Reviewer: J Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000204 hasurvwt.doc

Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3629 / 3633

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/8/99
- *C. tentans* acute test: 10/8/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12611	6.8			black mud w/leaf litter
12612	7.7			Fine Brown mud
12613	7.7			Soft Brown mud
12614	7.5			Soft Brown mud
12638	7.6			Soft Brown mud
12639	7.3			sticks + leaves on top + through out cohesive mud, dark
12640	7.2			sticks + leaf litter Dark thick mud
12641	7.2			Soft Brown mud
12622 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% $CaCO_3$). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: JJG Date: 10/8/99

Reviewer: JM Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

000205

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Sediment Characterization

Client: Menzie-Cura & Assoc.	Project: 99033	BTR: 3641

Date sediments distributed to test chambers (100 mL homogenized sediment):

- *H. azteca* acute test: 10/9/99
- *C. tentans* acute test: 10/9/99
- *H. azteca* chronic test:
- *C. tentans* chronic test:

Sample Number	porew pH	porew H2S	porew Amm	Sediment Visual Characterization
12664	7.8			fine cohesive mud.
12665	7.3			fine soft mud
12666	7.5			fine. Sticky/cohesive mud
~~12667~~ JG 12671	7.4			fine, brown mud - chironomids present
12668 LCS				EPA artificial control sediment (77% med. and fine sand; 17% kaolinite clay; 5% 0.5 mm-sieved peat; 1% CaCO3). Stored dry, then hydrated prior to addition to test chambers.

Extract porewater, measure and record pH, decant and preserve sulfide and ammonia samples.

Entered by: [signature] Date: 10/9/99

Reviewer: [signature] Date: 12/10/99

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Preparation of Formulated Control Sediment
for
Freshwater Sediment Toxicity Tests

Procedure based on EPA/600/R-94/024

Batch No. 10/4 Preparation Date: 10/4/99 Prepared by: JJG.

Ingredient	Amount (g)	Percent composition
Fine sand	1848	
Medium sand	924	77
Kaolinite clay	612	17
Blended and 0.~~3~~ 50 mm sieved Canadian sphagnum peat	180	5
CaCO3	36	1
Total	3600	100

Store well-mixed and dry in a sealed Rubbermaid box. Label by batch number. Store copy of this documentation in project file. Store original in Sed/Water preparation notebook.

Hydrate to a cohesive sediment consistency before use.

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of October 17, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets? TWICE DAILY	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓ (1)	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1 L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JM JG 10/17	JG 10/18	JG JM 10/19	JG 10/20 JM	JG 10/21	JM 10/22	JG 10/23

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments: C. Harris chronic test set ups were fed on Day -1 (day prior to organism additions) 12/10/99

Exposure water for H.a. chronic = Lake/Recon mix.
Exposure water for C.T. chronic = Recon water. 10/22/99

Reviewer ____ Date 12/9/99
Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of October 31, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	—	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	JG 10/31	11/1 JG	11/2 TM	11/3 TM	11/4 TM	JG 11/5	JG 11/6

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments: 11/5/99 (midnight) renewal missed. Renewal initiated at 09:20
"Noon" renewal conducted at 14:00 11/6 JG 11/6/99 JJG

Reviewer J Date 12/9/99

seddelfw.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of November 7, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

Test monitoring

• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	—	✓	—	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓

Additional activities

Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

Corrective Action / Comments							
Initials/Date	JG TM 11/7/99	JG TM 11/8	TM JG 11/9	TM 11/10	TM 11/11	JG 11/12	JG 11/13

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer [signature] Date 12/9/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of November 14, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

Test monitoring

• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	✓	✓	—	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓

Additional activities

Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

Corrective Action / Comments							
Initials/Date	TM JG 11/14/99	JG JM 11/15/99	TM 11/16/99	JG 11/17	TM 11/18	TM JG 11/19	JG 11/20

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer ______ Date 12/9/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of November 21, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓

Noon delivery cycle

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• splitter boxes filling?	✓	✓	✓	✓	At 11:00 AM	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

Test monitoring

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	✓	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	[illegible] CS ✓	✓	✓

Additional activities

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Corrective Action / Comments							
Initials/Date	TM 11/21	JG 11/22	JGH 11/23	JM 11/24	TM 11/25	JG 11/26	JG 11/27

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer J Date 12/9/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of November 28, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓	✓	✓	✓	✓
• D.O. ok?	—	✓	✓	✓	✓	✓	—
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	✓	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓
Corrective Action / Comments							
Initials/Date	TM 11/28/99	JG 11/29 TM	TM 11/30	TM 12/1	TM 12/2	JG 12/3	JG 12/4

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer J Date 12/9/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY SEDIMENT TOXICITY TESTS

Week of December 5, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Noon delivery cycle							
• splitter boxes filling?	✓	✓	✓	✓	✓	✓	✓
• syringes filling?	✓	✓	✓	✓	✓	✓	✓
• needles flowing?	✓	✓	✓	✓	✓	✓	✓
• beaker screens clear, flowing?	✓	✓	✓	✓	✓	✓	✓
• drainage to waste ok?	✓	✓	✓	✓	✓	✓	✓
• empty waste buckets?	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Test monitoring							
• test temperature ok?	✓	✓	✓ TM	✓	✓	✓	✓
• D.O. ok? * Sample 611 low		✓	(+1) ✓	(+1) ✓	✓	✓	— ✓
• check for floating organisms	✓	✓	✓	✓	✓	✓	✓
• feeding completed?	✓	✓	✓	✓	✓	Skipped JG	✓
Additional activities							
Prior to midnight fill reservoirs (1L)	✓	✓	✓	✓	✓	✓	✓
Check sediment water supply	✓	✓	✓	✓	✓	✓	✓

Corrective Action / Comments							
Initials/Date	JG 12/5/99	JG TM 12/6	JG TM 12/7	TM 12/8	TM 12/9	JG 12/10	JG 12/11

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments: * Sample 611 received an extra renewal. 12/5 JG 1030
(+1) Sample 548 received an extra renewal 12/8 TM

Reviewer [signature] Date 12/22/99

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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

DAILY CHECKLIST FOR AUTOMATED DELIVERY
SEDIMENT TOXICITY TESTS

Week of December 12, 1999

ACTIVITY / DAY	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Prior to noon fill reservoirs (1L)	✓						

Noon delivery cycle

• splitter boxes filling?	✓						
• syringes filling?	✓						
• needles flowing?	✓						
• beaker screens clear, flowing?	✓						
• drainage to waste ok?	✓						
• empty waste buckets?	✓						

Test monitoring

• test temperature ok?	✓						
• D.O. ok?	—						
• check for floating organisms	✓						
• feeding completed?	Skipped						

Additional activities

Prior to midnight fill reservoirs (1L)	✓						
Check sediment water supply	✓						

Corrective Action / Comments							
Initials/Date	TM 12/12						

Procedure: All operating systems listed above must be checked on a daily basis when sediment toxicity tests are in progress. Corrective action must be taken whenever appropriate. Document corrective action on this form. If project-specific documentation is required, write a brief description (on Project Documentation form) and include with the test data package.

Comments:

Reviewer ________ Date 12/22/99
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Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

SEDIMENT TEST MANUAL RENEWAL

DAILY SCHEDULE: MORNING (0700 – 0800) AND EVENING (1800-1900)

October, 1999

Day of Month	AM Renewal Time	Initials	PM Renewal Time	Initials
1				
2				
3				
4				
5				
6				
7				
8				
9			2230	J
10	09:00	JJG	17:00 c.t. 1915 J	TM
11	09:00	JJG	19:00	RB
12	07 15	J	17:00	JJG
13	07:00	TM	1830	J
14	07:00	TM	1830	LS
15	07:40	JJG	1815	LS
16	07:20	LS	18:30	JJG
17	07:30	JJG	—	—
18	07:30	TM	—	—
19	—	—	—	—
20	07:30	JJG	—	—
21	~~07:20~~ LS	~~LS~~	~~1807:00~~ 1900	TM
22	07:20	LS	19:00	TM
23	07:30	JJG	18:00	LS
24	07:30	JJG	19:00	TM
25	07:00	TM	1900	J
26	07:00	TM	~~07:00~~ 19:00	JG
27	07:00	TM	~~07:00~~ 19:00	JG
28	07:00	TM	~~07:00~~ 19:00	TM
29	07:00	TM	19:00	JG
30	07:15	LS	18:30	JG
31	07:30	TM	19:00	JG

J 12/22/99

000216

SEDIMENT TEST MANUAL RENEWAL

DAILY SCHEDULE: MORNING (0700 – 0800) AND EVENING (1800-1900)

November, 1999

Day of Month	AM Renewal Time	Initials	PM Renewal Time	Initials
1	07:30	JG	19:00	TM
2	07:15	TM	18:45	JG
3	07:10	J	18:45	TM
4	07:25	J	19:00	TM
5	07:25	J	18:30	JG
6	08:30	JG	18:00	[illegible]
7	08:00	TM	18:30	JG
8	08:00	JG	19:30	TM
9	07:00	TM	19:00	JG
10	07:00	TM	18:30	J
11	07:00	TM	1900	J
12	08:00	J	19:00	JG
13	07:00	LS	19:00	JG
14	07:00	TM	19:15	JG
15	08:00	JG	19:00	TM
16	07:00	TM	19:00	JG
17	07:30	JG	19:00	TM
18	07:00	TM	18:30	LS
19	07:00	JM		
20				
21			19:15 System check	J
22			19:00 system check	TM
23	07:00	JM system check	18:00	JG
24	07:00	JM system check	1900	TM
25	07:00	TM	1915	J
26	07:00	JG for Cd	1955	J
27	09:30	JG system check		
28	08:30	TM system check	18:00	JG
29	08:30 JG System check		18:30	TM JG
30	07.30 TM system check		18:00	JG
31				

On 11/19/99 All sediment tests were placed with automated renewal system w/ renewals at 12:00 & 24:00 daily J

J 12/22/99

000217

List of events where data for time to mortality of emergent flies was not generated

SAMPLE	REPLICATE	PARAMETER	DAY	EVENT
12548	C	FS	36	NR
12548	D	MS	27	ESC
12548	D	MS	28	NR
12552	A	FS	26	NR
12552	D	FS	24	ESC
12552	E	MS	26	NR
12592	H	FS	31	NR
12592	H	MS	31	NR
12592	H	MS	31	NR
12593	F	MS	23	ESC
12593	E	MS	24	ESC
12593	E	MS	25	NR
12593	D	FS	31	ESC
12609	B	MS	32	ESC
12609	D	MS	37	ESC
12609	E	MS	33	NR
12614	G	FS	27	ESC
12622	A	MS	23	ESC
12622	E	FS	24	NR
12622	F	FS	27	NR
12668	A	FS	27	NR
12668	D	FS	26	NR
12668	D	MS	26	NR
12668	F	MS	25	NR
12668	H	MS	22	ESC

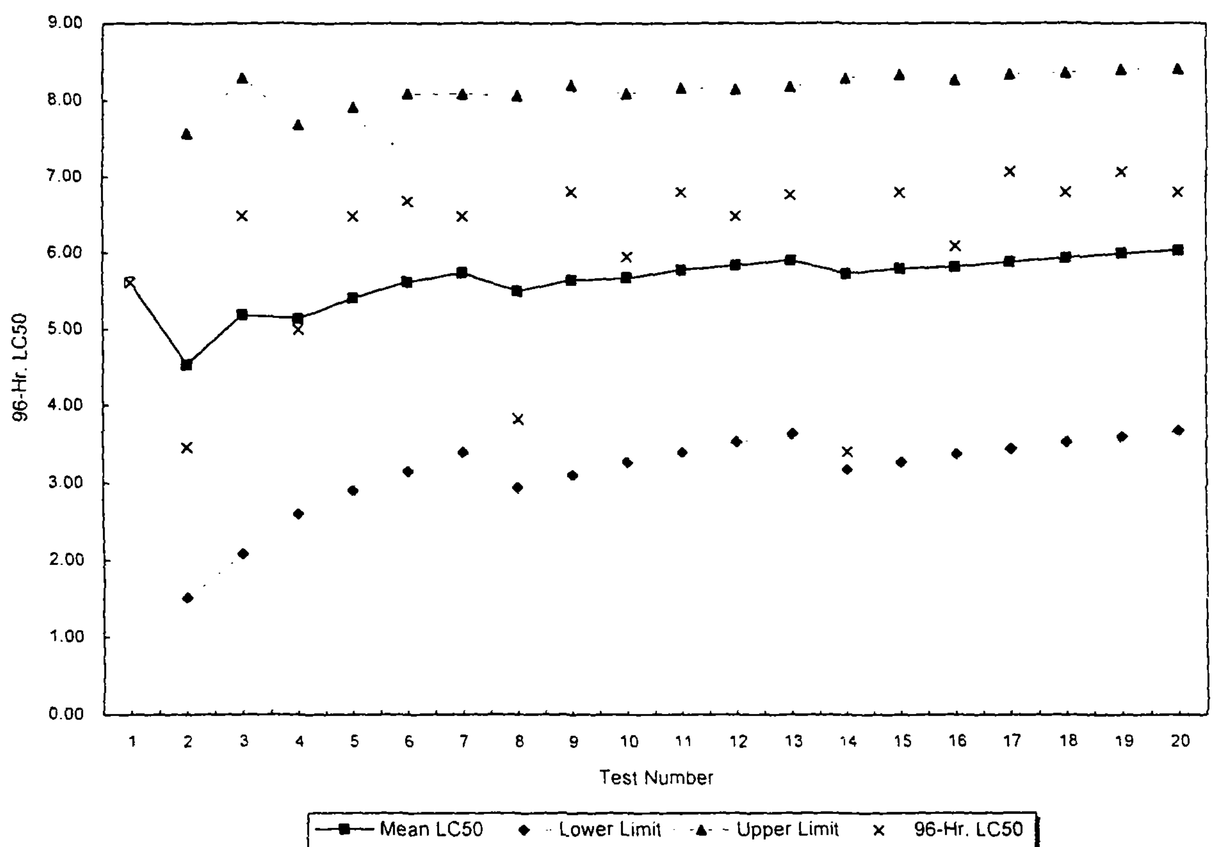
Note:
-On day 37 a fly of unknown sex emerged from sample 12665 F, it was not recorded on the data sheet due to its unknown sex. The fly was included in the total number of emergent flies.
-An emergence case was found in sample 12665 H prior to the installation of emergence traps. Survival and sex of the fly were not recorded but the fly was included in the total number of emergent flies.
-A female from 12668 C produced a primary egg case prior to being collected. Egg data was not recorded.

MS= Male Survival
FS= Female Survival
UE= Unhatched Eggs
INJ= Injured
NC= Not Counted
NR= Not Recorded
ESC= Escaped

APPENDIX D

Reference Toxicant Control Chart
Chironomus tentans
in Potassium chloride (g/L)

Test Number	Test Date	Organism Age (Days)	96-Hr. LC50	Mean LC50	Lower Limit	Upper Limit	Organism Source
1	10/31/97	9	5.612	5.61			Aquatec Biological Sciences
2	11/02/97	9	3.466	4.54	1.50	7.57	Aquatec Biological Sciences
3	11/09/97	10	6.484	5.19	2.08	8.29	Aquatec Biological Sciences
4	11/10/97	9	5.000	5.14	2.60	7.68	Aquatec Biological Sciences
5	08/23/98	11	6.484	5.41	2.90	7.92	Aquatec Biological Sciences
6	09/15/98	9	6.674	5.62	3.15	8.09	Aquatec Biological Sciences
7	10/23/98	10	6.484	5.74	3.40	8.09	Aquatec Biological Sciences
8	11/10/98	9	3.827	5.50	2.94	8.07	Aquatec Biological Sciences
9	06/20/99	9	6.804	5.65	3.10	8.20	Aquatec Biological Sciences
10	06/24/99	11 and 12	5.946	5.68	3.27	8.09	Aquatec Biological Sciences
11	06/26/99	9 and 11	6.804	5.78	3.40	8.17	Aquatec Biological Sciences
12	07/15/99	13	6.484	5.84	3.53	8.15	Env. Consulting & Testing
13	07/16/99	10	6.771	5.91	3.64	8.18	Aquatec Biological Sciences
14	07/16/99	9	3.400	5.73	3.17	8.29	Aquatec Biological Sciences
15	07/16/99	8	6.804	5.80	3.27	8.33	Env. Consulting & Testing
16	09/13/99	10	6.095	5.82	3.37	8.27	Aquatec Biological Sciences
17	10/07/99	11	7.071	5.89	3.45	8.34	Aquatec Biological Sciences
18	10/11/99	10	6.804	5.95	3.53	8.36	Aquatec Biological Sciences
19	10/27/99	8	7.071	6.00	3.60	8.40	Aquatec Biological Sciences
20	11/13/99	12	6.804	6.04	3.68	8.41	Aquatec Biological Sciences



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